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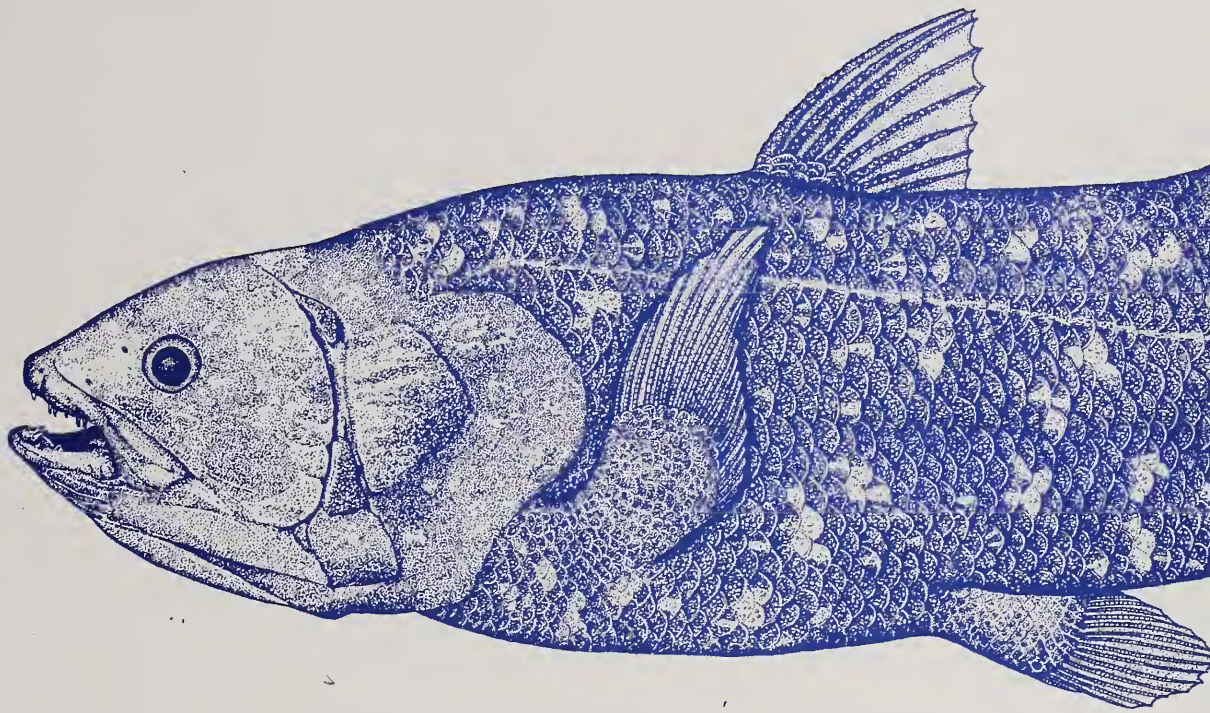

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Margaret Mary Smith (1916–1987),
James Leonard Brierley Smith (1897–1968)
with their dog Marlin

The publication series (Monographs, Bulletins & Special Publications) of SAIAB (formerly the JLB Smith Institute of Ichthyology), in its new format, honours James Leonard Brierley Smith and Margaret Mary Smith with the name Smithiana, in recognition of their many years of devoted service to African aquatic biology. Their life's work, a team effort, established modern ichthyology in southern Africa and laid the groundwork for the expansion of aquatic biology throughout the region.

CONTENTS

Smithiana Bulletins and Monographs are publications of the South African Institute for Aquatic Biodiversity, for original scientific articles in the fields of taxonomy, systematics, ethology, ecology, biogeography and conservation of the fishes of Africa and its surrounding waters. Priority will be given to papers by staff and associates of the Institute. Manuscripts from outside the Institute will be considered if they are pertinent to the work of the Institute or use the Institute's collections.

Editor: Mr Wouter Holleman
SAIAB: Scientific Publications, Private Bag 1015, Grahamstown, 6140 South Africa
w.holleman@saiab.ac.za

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A review of the anthiine fish genus *Plectranthias* (Perciformes: Serranidae) of the Western Indian Ocean, with description of a new species, and a key to the species

Phillip C. Heemstra[1] and John E. Randall[2]

[1] South African Institute for Aquatic Biodiversity
Private Bag 1015, Grahamstown, 6140 South Africa, e-mail p.heemstra@saiab.ac.za
[2] Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA,
e-mail jackr@hawaii.rr.com

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Abstract. Thirteen species of the serranid fish genus *Plectranthias* Bleeker (1873) are recognized in the Western Indian Ocean (including the Red Sea and Persian Gulf): *Plectranthias bauchotae* Randall 1980, *P. gardineri* (Regan 1908), *P. inermis* Randall 1980, *P. intermedius* (Kotthaus 1973), *P. klausewitzi* Zajonz 2006, *P. longimanus* (Weber 1913), *P. maugei* Randall 1980, *P. morgansi* (Smith 1961), *P. nanus* Randall 1980, *P. pelicieri* Randall & Shimizu 1994, *P. vexillarius* Randall 1980, *P. winniensis* Tyler 1966, and a new species, *P. elaine* sp. nov., from the east coast of South Africa is described. Diagnoses, distributions, illustrations and a key to the Western Indian Ocean species are given.

Keywords: Serranidae, Anthiinae, new species, *Plectranthias*

INTRODUCTION

As part of a multi-authored project to review the taxonomy and diversity of the coastal fishes of the Western Indian Ocean, we examined specimens of the serranid Subfamily Anthiinae. A new species of the genus *Plectranthias* was recognized from unidentified material in the South African Institute for Aquatic Biodiversity, and is described in this paper. New morphological data and new distributions for *Plectranthias gardineri, P. longimanus, P. morgansi, P. pelicieri* and *P. winniensis* are recorded. Diagnoses and a key for all Western Indian Ocean *Plectranthias* species are also presented.

The serranid fish genus *Plectranthias* Bleeker 1873 was revised by Randall (1980) who recognized 30 species, 13 of which were new. Most species are found in tropical waters on coral or rocky reefs in depths of 20 to 300 m. They are solitary, sedentary, and some species are seen perched on the substrate like hawkfishes (Cirrhitidae), which have a similar gestalt. The smaller, cryptic coral reef species, such as *Plectranthias nanus, longimanus* and *winniensis* are rarely seen by scuba divers, because they reside in the hidden interstices of the reef. The species that occur in the rugged, deep-reef habitat (50 to 300 m) are not often caught in trawls, and because of their small size (most species less than 10 cm SL) they are rarely caught on the large hooks used by anglers fishing in their habitats. Consequently, most *Plectranthias* species are rare in fish collections, and 20 of the valid species are known from only one or two specimens.

The genus *Plectranthias* comprises a heterogeneous assemblage of 45 currently recognized valid species. Thirteen species are here recognized from the western Indian Ocean (west of the southern tip of India and including the Red Sea).

METHODS

The posterior most dorsal and anal-fin rays are split to their base but counted as a single ray. The spinous rays of the dorsal and anal fins are termed dorsal-fin spines and anal-fin spines; and their numbers are given in Roman numerals in the fin formulae. The soft (segmented) fin rays are called rays and their numbers are given in Arabic numerals. Some species of *Plectranthias* have fleshy appendages at the tips of some dorsal-fin spines. If the appendage is longer than the eye diameter, we call it a 'banner'; if it is shorter than the eye diameter, then it is a 'cirrus'. Gill-raker counts are of the first gill arch, include all rudiments, with the raker at the angle of the arch included in the count for the lower limb, and are given as A-B / C-D where A-B is the range of counts for the upper limb and C-D the range of counts for the lower limb. Cheek scale counts are the oblique series of large scales between the eye and the lower rear edge of the preopercle. Standard length (SL), head length and snout length were measured from the front edge of the upper lip to the caudal fin base, rear edge of the opercular membrane, and the front edge of the bony orbit respectively. Eye diameter and interorbital width are of the bony orbit. Body depth

Table 1. Comparison of the characters of Western Indian Ocean *Plectranthias* species.

Species	Preopercle lower edge antrorse spine/s	Interopercle & subopercle serrae	Body depth - % SL	Dorsal fin rays	Pectoral-fin rays / branched	Anal-fin rays	Branched caudal-fin rays	Caudal fin rear margin	Lateral-line complete	Interorbital (IO) & top of head scaly	Scale series on cheek / maxilla	Gill-rakers	Longest D spine / banners
bauchotae	2	weak	39–43	16	14–15 / yes	7	15	emarginate	yes	scaly	6–7 / no	5 / 10–12	3rd / short banners
gardineri	1 small spine	distinct	37–39	14	14–15 / no	6 or 7	13	rounded	no	scaly	6 / yes	4–5 / 9–11	4th / none
inermis	no	smooth	32–37	16–20	13 / no	7	13	truncate	yes	mid-IO	4–5 / no	5–6 / 10–12	3rd / large
intermedius	2	distinct	37–38	17	14–15 / yes	6 or 7	15	UR long	yes	mid-IO	10 / yes	5–6 / 12	3rd or 4th / none
klausewitzi	no	smooth	32–37	14–15	14–15 / yes	7	15–17	emarginate	yes	scaly	7–8 / no	4–5 / 11–13	3rd / short
longimanus	2	distinct	32–38	13–15	12–13 / no	6 or 7	15	~ rounded	no	mid-IO	4–5 / no	4–6 / 9–12	4th / none
maugei	no	smooth	37–38	15	13 / no	7	14	lunate	yes	scaly	6 / no	5 / 11–12	4th / short cirri
morgansi	no	weak	39–41	13–15	13–14 / no	7	15	truncate	yes	scaly	5 / no	5–6 / 11–12	3rd / long
nanus	2	weak	28–34	16	14–16 / no	6	15	rounded	no	mid-IO	4 / no	5–6 / 13–14	4th / none
pelicieri	2	irregular	35–38	15–17	13 / no	7 or 8	15	emarginate	yes	naked	5 / no	5 / 11–12	3rd / long cirri
elaine	2 large spines	distinct	41–48	13–15	12–14 / yes	7	15	emarginate	yes	scaly	5 / no	4–6 / 10–12	3rd / banner
vexillarius	irregular	smooth	37	17	13 / no	7	15	emarginate	yes	scaly	7 / no	4 / 10	3rd / banner
winniensis	2	0–2 weak	29–36	16–17	16–18 / no	7	15	concave	no	mid-IO	4–5 / no	4–6 / 11–15	4th/ none

Table 2. Fin ray counts for Western Indian Ocean *Plectranthias* species.

Species	Dorsal-fin rays								Anal-fin rays			Pectoral-fin rays					
	13	14	15	16	17	18	19	20	6	7	8	12	13	14	15	16	17
bauchotae				8						8				7	1		
elaine		1	4							7		3	2	6			
gardneri		11							2	9				5	10		
inermis				3	11	3	2	1		14		13	8				
intermedius					2				1	1				1	2		
klausewitzi		2	1							7				1	2		
longimanus	25	17	2						15	27		9	43				
maugei			3							3			3				
morgansi	1	2	2	1						6		1	3	7			
nanus					2				1	1					2		
pelicieri			1	12	6					17	2	3	35				
vexillarius					1					1			1				
winniensis			1	25	8					20						19	24

is the greatest depth of the body. Lateral-line scale counts are the number of tubed scales in the lateral-line. Configuration of supraneural bones and anterior neural spines is given in the formula of Ahlstrom et al. 1976: 0/0+0/2/1+1/1/1/ with supraneurals indicated by 0, neural spines by / and pterygiophores with their associated spines by Arabic numerals.

Museum codes for material that we examined are as follows: ANSP (Academy of Natural Sciences, Philadelphia), BMNH (The Natural History Museum, London), BPBM (Bernice P. Bishop Museum, Honolulu, Hawaii), HUMZ (Hokkaido University Museum of Zoology, Hakodate), MNHN (Muséum National d'Histoire Naturelle, Paris), SMF (Senckenberg Research Institute and Natural History Museum, Frankfurt am Main). The name of the J.L.B. Smith Institute of Ichthyology was changed to the South African Institute for Aquatic Biodiversity, Grahamstown, with SAIAB as the acronym for its fish collection.

Genus *Plectranthias* Bleeker 1873

Diagnosis (based on Western Indian Ocean species): Dorsal fin with 10 spines, 13–20 rays; the fin margin slightly to deeply notched before the soft-rayed part; anal fin with 3 spines, 6–8 rays; the last dorsal and anal fin rays are usually double (split to the base, but counted as a single ray); pectoral fin rays 12–18, branched or unbranched. In species with branched pectoral fin rays, the pectoral-fin rays of juveniles may be unbranched. The proximal part of the median and pectoral fins are covered with minute, thin scales. Body oval to oblong, depth 2.3–3.1 in SL. Body scales large, distinctly ctenoid; lateral-line complete or interrupted below soft dorsal fin. Head more or less covered with scales. Maxilla with a low ridge along dorsal edge. Vomer and palatines with teeth. Branchiostegal rays 7; vertebrae 10+16; supraneurals 2 or 3.

KEY TO PLECTRANTHIAS SPECIES OF THE WESTERN INDIAN OCEAN

1a. Preopercle, interopercle and subopercle smooth; dorsal-fin rays 16–20; pectoral-fin rays 13, none branched; third dorsal-fin spine with a long, fleshy banner at the tip ..... *P. inermis*

1b. Preopercle serrate dorsally, the serrae distinct, small or minute; interopercle and subopercle smooth or serrate; dorsal-fin rays 13–17; pectoral-fin rays 12–15; the central rays branched in adults of some species; third dorsal-fin spine with or without a banner 2

2a. Lateral-line interrupted below soft dorsal fin, with 12–22 tubed scales, peduncle with or without pored scales 3

2b. Lateral-line complete, with 27–34 tubed scales extending to caudal fin base 6

3a. Body depth 2.3–2.5 in SL, subequal to head length; maxilla with a row of 5–11 small ctenoid scales dorsally; no antrorse spines on lower edge of preopercle ..... *P. gardineri*
3b. Body depth 2.6–3.4 in SL, less than head length; no scales on maxilla; ventral edge of preopercle with 1 or 2 separate antrorse spines (often hidden by skin and scales) 4

4a. Dorsal-fin rays 13–15; pectoral-fin rays 12–13; body mottled dark brown, small black spots on peduncle, a row of 5 black spots from base of lower caudal rays along ventral surface of peduncle and anal-fin base ..... *P. longimanus*
4b. Dorsal-fin rays 16–17; pectoral-fin rays 14–18; colour pattern not as in 4a 5

5a. Pectoral-fin rays 14–16; branched caudal-fin rays 15; head and body mottled dark brown, with 2 small dark brown spots, one above the other on caudal fin base ..... *P. nanus*
5b. Pectoral-fin rays 16–18; branched caudal rays usually 13; head and body reddish brown with red spots, but no small dark brown spots at base of caudal fin ..... *P. winniensis*

6a. Body pale, with a dark band or series of dark spots along base of dorsal fin and curving ventrally onto peduncle; cheek with 10 oblique scale series ..... *P. intermedius*
6b. No dark band along dorsal-fin base; oblique cheek scale series 4–8 7

7a. Top of head and interorbital area naked; ventral edge of preopercle with 2 antrorse spines ..... *P. pelicieri*
7b. Top of head scaly to at least mid-interorbital area 8

8a. Ventral edge of preopercle with 2 antrorse spines; body depth 2.1–2.6 in SL 9
8b. Ventral edge of preopercle smooth or irregular; body depth 2.3–3.1in SL 10

9a. Dorsal-fin rays 16; pectoral-fin rays 14–15; subopercle and interopercle serrae weak ..... *P. bauchotae*
9b. Dorsal-fin rays 15; pectoral-fin rays 12–14; subopercle and interopercle serrae distinct ..... *P. elaine* sp. nov.

10a. Dorsal-fin rays 17, a few elongate; 3rd dorsal fin spine elongate, with a fleshy banner at tip ..... *P. vexillarius*
10b. Dorsal fin rays 13–15 11

11a. Caudal fin lunate; head and body pale with 8 small dark blotches dorsally; a short cirrus at tip of each dorsal-fin spine ..... *P. maugei*
11b. Caudal fin emarginate or truncate; some dorsal-fin spines without cirrus at tips 12

12a. Body oval, depth 2.4–2.6 in SL; lateral-line scales 9–16, usually with dark pigment; first two interspinous membranes of dorsal fin white, 3rd dorsal-fin spine elongate, with a long white banner at tip; no cirri on the other dorsal-fin spines; pectoral-fin rays 13–14, central rays usually unbranched ..... *P. morgansi*
12b. Body oblong, depth 2.7–3.1 in SL; no dark pigment on lateral-line scales; pectoral-fin rays 14–15, central rays branched; 3rd dorsal-fin spine longest, with a short cirrus at tip ..... *P. klausewitzi*

Plectranthias bauchotae Randall
Fig. 1

Plectranthias bauchotae Randall 1980: 116, Fig. 4. (Banc de l'Etoil, S of Madagascar; 25°54' S, 44°36' E); Katayama & Yamamoto 1986: 389, Fig. 2. (Redescription based on seven specimens from Saya de Malha Bank, NE of Madagascar).

DIAGNOSIS. Dorsal fin rays X, 16, the fin margin distinctly notched before soft-rayed part, 3rd spine longest, 1.7 in head length, with a cirrus (about one-third length of spine) at spine tip; dorsal spines 2, 4, 5 and 6 with a shorter cirrus at their tip; penultimate and last dorsal-fin spines subequal, about half length of 3rd spine; anal-fin rays III, 7, 2nd spine longest, twice length of first spine but shorter than longest anal-fin ray; caudal fin emarginate, branched rays 15; the tips of uppermost rays broken, but their length estimated as 1.4 in head; pectoral-fin rays 14, upper and lowermost rays unbranched, rest branched, fin length 1.2 in head, reaching vertical at 4th anal-fin ray; pelvic fins not reaching anus, 1.7 in head. Body oval, greatest depth 2.3–2.6, head length 2.2–2.4 in SL; peduncle depth 3.4–3.9, orbit diameter 3.4–4.1, bony interorbital width 5.6–6.8, snout length 3.6–4.2 all in head length. Lateral-line complete, with 30–32 tubed scales; 2 rows of large scales between 5th dorsal spine and lateral-line; circum-peduncular scales 14; scales on top of head reach rear nostrils; operculum scaly; 6 or 7 oblique series of large scales on cheek; snout, maxilla, suborbitals and lower jaw naked. Preopercle posterior edge with 39–41 serrae, lower edge with 2 small antrorse spines; subopercle with 3 weak serrae; interopercle with 0–3 weak serrae. Lower jaw with a pair of moderate canines near

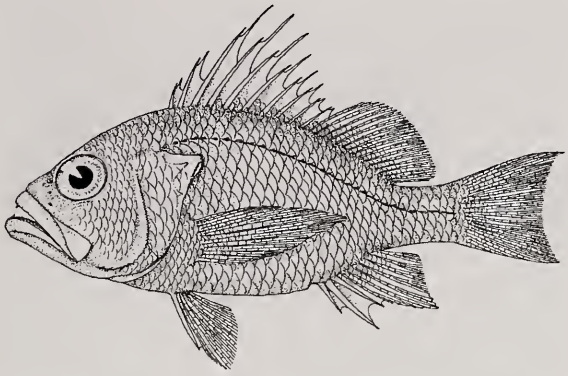

Fig. 1. *Plectranthias bauchotae*, 119 mm SL, Saya de Malha Bank, HUMZ 72438 (from Katayama and Yamamoto 1986).

symphysis. Gill-rakers 5 / 10–12. Three supraneural bones: 0/0+0/2/1+1/1/1/.

Life colour from Katayama and Yamamoto (1986): "Body reddish yellow with two diffuse dark red bars posteriorly, first bar under posterior dorsal-fin spines and anterior soft rays, 2nd bar at base of peduncle; small yellow spots scattered on body side; fins reddish yellow." In alcohol uniform buff.

REMARKS. Known from the 82 mm SL holotype, collected south of Madagascar and seven specimens (80–119 mm SL) collected in 125–191 m from the Saya de Malha Bank northeast of Madagascar. *P. bauchotae* is larger than any of the other *Plectranthias* species in the Western Indian Ocean.

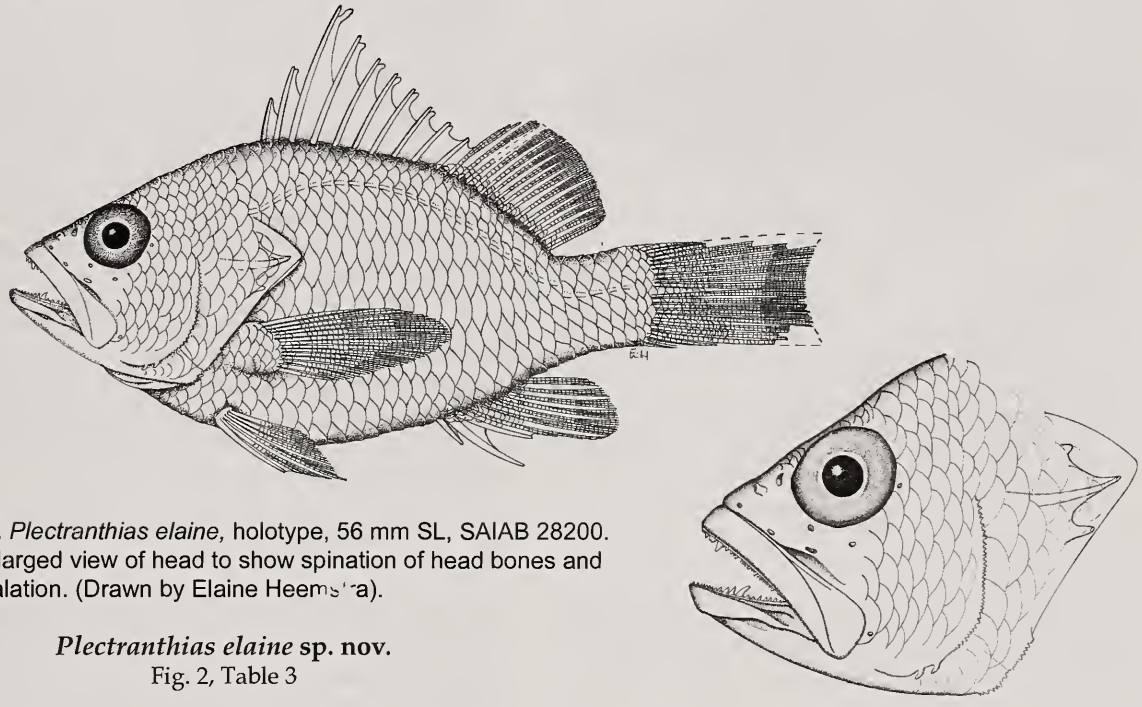

Fig. 2. *Plectranthias elaine*, holotype, 56 mm SL, SAIAB 28200. Enlarged view of head to show spination of head bones and scalation. (Drawn by Elaine Heemstra).

Plectranthias elaine sp. nov.

Fig. 2, Table 3

Holotype. SAIAB 28200, 56 mm SL, male, South Africa, off Qolora River, Eastern Cape Province (32°38.2' S, 28°27.6' E); depth 114 m; trawl; Clive Potter, collector; 13 June 1983.

Paratypes. BPBM 35049, 42 mm SL, South Africa, off Jesser Point, Sodwana Bay, KwaZulu-Natal (27°32.8' S, 32°42.6' E) depth 68 m; dredge; R/V *MEIRING NAUDE* Sta. ZH3; Richard Kilburn, collector; 3 June 1987. SAIAB 28204, 21 mm SL, female, South Africa, off Kosi Bay (26°54.6' S, 32°56.6' E); depth 75 m; dredge; R/V *MEIRING NAUDE* Sta. ZA13; Richard Kilburn, collector, 7 June 1987. SAIAB 28205, 29 mm SL, female; 22 mm SL; data same as BPBM 35049.

DESCRIPTION. Holotype data are given first, followed by data for paratypes (in parentheses) if different; additional measurements are given in Table 3. Dorsal-fin rays X, 15, the fin margin moderately notched before soft-rayed part, 3rd spine longest, 24% (30%) SL, 1.8 in head length; short cirrus behind tips of spines 3, 4 and 5; anal-fin rays III, 7, 2nd spine longest; 2nd and 3rd anal-fin rays elongated; pectoral fins with 14 rays, all branched except upper and lowermost 2 or 3 rays, fin reaching vertical at 3rd (4th) anal-fin ray; caudal fin slightly emarginate, principal rays 17, branched rays 15; 3 uppermost principal rays slightly produced; pelvic fins not reaching anus. Body oval; depth 2.1 (2.3–2.5), head length 2.3 (2.2–2.4), peduncle depth 7.2 (7.6) in SL; orbit diameter greater than snout length, 3.8 (3.4), snout length 4.8 (4.4–5.0), bony interorbital width 7.4 (9.8) in head length. Lateral-line complete, with 31 (28, 30) tubed scales; 2 rows of large scales between middle dorsal-fin spines and lateral-line; 3 scales from dorsal-

Table 3. Measurements as %SL of the holotype and BPBM 25049, paratype of *Plectranthias elaine*.

	Holotype	Paratype
Standard length (mm)	56 mm	42 mm
Body depth	48	41
Body width	24	21
Head length	44	44
Snout length	9.2	10
Orbit diameter	12	13
Interorbital width	5.9	4.5
Upper jaw length	22	21
Maxilla width	5.4	4.8
Pectoral-fin length	34	36
Pelvic-fin length	25	25
Snout to D-fin origin	41	42
Snout to anal-fin origin	69	71
Peduncle depth	14	14
Peduncle length	19	18
Upper caudal-fin rays	30	30
Lower caudal-fin rays	28	28
Anal-fin length	32	31
First anal-fin spine	7.7	6.9
Second anal-fin spine	15	16
Third anal-fin spine	14	14
Third dorsal-fin spine	24	24
Fourth dorsal-fin spine	19	21
Last dorsal-fin spine	7.5	10
Pelvic-fin spine	14	15

fin origin to lateral-line; circum-peduncular scales 5-2-7 = 14; dorsal part of head and interorbital area scaly to posterior nostrils; preorbital, snout, maxilla and lower jaw naked; opercle, interopercle and subopercle scaly; cheek with 6 (4 or 5) oblique scale series; proximal third of soft dorsal fin and proximal half of anal fin scaly; caudal and pectoral-fin bases scaly. Preopercle rounded, posterior edge with 36 (14, 23) serrae; ventral edge with 2 large antrorse serrae, hidden by skin and scales; subopercle and interopercle edge distinctly serrate. Maxilla reaching vertical at rear edge of pupil; proximal part of maxilla with a low, narrow ledge along dorsal margin, but no supramaxilla; (the 42 mm SL paratype has a minute, splint-like supramaxilla on rear upper edge of both maxillae). Upper jaw with a band of villiform teeth, a widely separated pair of short, stout, fixed conical teeth, one on each side of diastema in front of an inner group of 7 slender depressible teeth; lower jaw with a band of villiform teeth in 3–5 irregular rows becoming wider anteriorly, an outer series of 10 slightly larger teeth at front of jaw barely projecting above lower lip; 2 fixed canines about one-third jaw length posteriorly from front of lower jaw; vomer with a chevron band of villiform teeth; palatines with a short band of 3 irregular rows of villiform teeth. Gill-rakers on lower limb 7 or 8 plus 3–5 rudiments, upper limb with 1 developed raker and 4 or 5 rudiments. Three supraneural bones: 0/0+0/2/1+1/1/1/1/.

Fresh colour unknown; preserved specimens immaculate.

REMARKS The 56 mm SL holotype is an adult male. Maximum size for this species is probably about 60 mm SL. The four type-specimens were collected with trawl and dredge off the South African east coast between Kosi Bay (26°55' S) and the Qolora River mouth (32°38' S) in depths of 68, 75, 85 and 114 m. The smallest specimen (21 mm SL) is a female with moderately large ova.

ETYMOLOGY. This species is named to honour Elaine Heemstra, in recognition of her numerous and valuable contributions to the study of fishes by her beautiful and accurate paintings and drawings and her astute observations of these fascinating creatures. The species epithet is a noun in apposition.

Plectranthias gardineri (Regan)

Fig. 3, Pl. 1 A

Xenanthias gardineri Regan 1908: 223, Pl. 28, Fig. 1 (Seychelles, Amirante Ids); Smith 1961: 367, Fig. 5 (copy of Regan's original figure).

Plectranthias gardineri: Randall 1980: 129, Fig. 8 (redescribed from four syntypes, 29 mm SL specimen designated as lectotype; copy of Regan's original figure); Randall & Shimizu 1994: 114, Fig. 3 (new data from five specimens 29–32 mm SL, from type locality in the Seychelles; colour photograph of fresh specimen).

DIAGNOSIS. Dorsal-fin rays X, 14–15, fin margin notched almost to base before soft-rayed part, 3rd or 4th spine longest, 1.9–2.3 in head length; no cirrus at spine tips; anal-fin rays III, 6–7, 2nd spine longest, twice length of first spine and longer than longest anal-fin ray; caudal fin rounded, branched rays 13–14; pectoral-fin rays 14–15, unbranched, fin 1.3–1.5 in head, reaching between verticals at anal-fin origin and 3rd ray; pelvic fins not reaching anus, 1.7–2.0 in head. Body oval, greatest depth 2.3–2.5, head length 2.3–2.5, peduncle depth 6.7–7.4 in

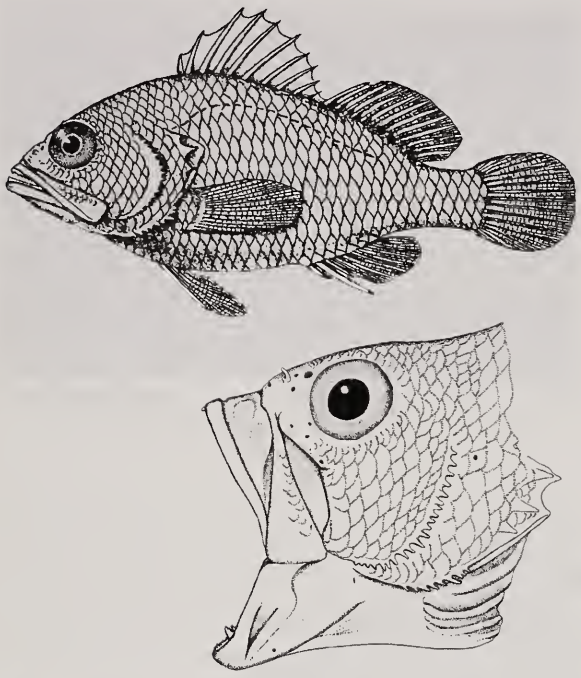

Fig. 3. *Plectranthias gardineri*, drawing of type specimen (32 mm SL, from Regan 1908). Head of 33 mm SL, non-type specimen, Mahé, Seychelles, SAIAB 62607 (drawn by Elaine Heemstra).

SL; orbit diameter 3.6–3.9, snout length, 4.1–4.8, bony interorbital width 8.0–8.5, all in head length. Lateral-line incomplete, ending below middle of soft dorsal fin, with 16–20 tubed scales; 1 row of large scales between 5th dorsal-fin spine and lateral-line; circum-peduncular scales 12; scales on top of head extend to rear nostrils; operculum scaly, with 5–7 oblique series of large scales on cheek and a series along interopercle; snout, suborbitals and lower jaw naked. Maxilla reaches past vertical at rear edge of eye; a row of 7–11 small ctenoid scales along (below) dorsal ledge of maxilla. Preopercle edge with 14–20 coarse serrae posteriorly; no antrorse spine on lower edge; subopercle and interopercle with 7–9 coarse serrae. Gill-rakers 4–5 / 9–11. Two supraneural bones: /0+0/2/1+1/1/1/. Fresh colour of 33 mm SL fish (from Randall and Shimizu 1994, Fig. 3): Head and body dull red, shading to pale yellow ventrally, irregular pale yellow or white blotches at bases of median and pectoral fins; spinous dorsal fin pale bluish white, as if daubed with thick paint; upper lip pale, with several red or white vertical bars. Iris reddish orange, with short thin radiating blue-grey streaks.

Remarks. Depth range 46–64 m. Known only from the Seychelles: five type-specimens, 29–32 mm SL, from Amirante Ids, six additional specimens collected in 1993 east of Bird Id, and another six collected in 2003 off Mahé.

Plectranthias inermis Randall

Fig. 4, Pl. 1 B, C

Plectranthias inermis Randall 1980: 135, fig. 11 (Philippines: Luzon, Batangas, Caban Id.). Heemstra 1996: 140, figs 1A & 2 (redescription incorporating original data, plus four specimens from Mauritius and new data from three Philippine fish; colour photograph of 38-mm SL fresh fish from Mauritius; drawing of head of 45 mm SL fish from Mauritius). Kuiter 2004: 109 (colour photographs of three live Pacific fish).

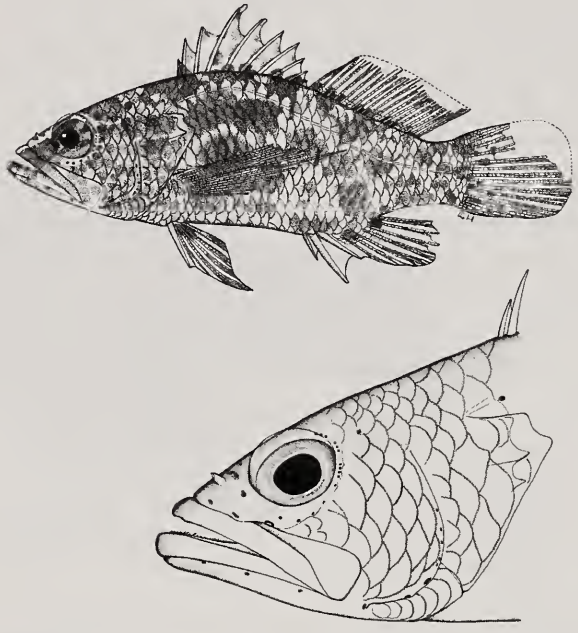

Fig. 4. *Plectranthias inermis*, 45 mm SL, Mauritius, SAIAB 51834. Head of same specimen (drawn by Elaine Heemstra, from Heemstra 1996).

Diagnosis. Dorsal-fin rays X, 16–20, fin margin divided to base before soft-rayed part, 3rd spine longest, 2.0–2.8 in head length, the tip with a long banner-like flap (about one-third length of spine); other dorsal spines (2, 4, 5 and 6) have a short cirrus at their tips; penultimate and last dorsal-fin spines subequal, length about one-fifth of 3rd spine; anal-fin rays III, 7, 2nd spine longest, twice length of first spine but shorter than longest anal-fin ray; caudal fin emarginate, branched rays 13–14; pectoral-fin rays 13, unbranched, fin length subequal to head, reaching to or past rear end of anal-fin base; pelvic fins reaching anus or 1 mm short of anus, 1.6–1.8 in head. Body oblong; greatest depth 2.3–2.9, head length 2.2–2.4, peduncle depth 6.2–7.0 in SL; orbit diameter 3.6–4.1, snout 3.9–5.1, bony interorbital width 11–14, all in head length. Lateral-line complete, with 28 tubed scales, or incomplete with 1–3 scales missing

tubes; one row of scales between 5th dorsal spine and lateral-line; circum-peduncular scales 14; scales on top of head extend to rear part of interorbital space; operculum scaly; cheek with 4 oblique series of large scales and a 5th series of 2–3 scales hidden by the 4th series; snout, maxilla, suborbitals and lower jaw naked; proximal two-thirds of maxilla with low ridge along dorsal margin. Preopercle edge smooth or with 1–5 minute serrae posteriorly; subopercle and interopercle smooth. Gill-rakers 5–6 / 10–12. Three supraneural bones: 0/0+0/2/1+1/1/1/.

Head and body covered with irregular or square-like, close-set reddish-yellow blotches, those on head more yellow; on the body, the pale grey or whitish interspaces form a grid-like pattern; median fins transparent, with reddish rays and spines; 3rd interspinous membrane of dorsal fin pale reddish proximally and white distally; soft dorsal, caudal and anal-fin rays whitish; pelvic fins whitish, with a red spot in axil and another red spot at base of 2nd anal-fin spine.

REMARKS. We examined 26 specimens, 17–45 mm SL; they were collected with rotenone or quinaldine on coral reefs, in caves or on coral rubble at depths of 14-65 m from Mauritius, Christmas Id (Indian Ocean), Molucca Ids, New Britain and the Philippines.

Plectranthias intermedius (Kotthaus)

Fig. 5

Xenanthias intermedius Kotthaus 1973: 26, figs 293–296 (Gulf of Aden, 60 nautical miles off Socotra).

Plectranthias intermedius: Randall 1980: 138, fig. 12 (redescription based on original description and examination of 89 mm SL paratype from Gulf of Aden).

DIAGNOSIS. Dorsal-fin rays X, 17, fin margin distinctly notched before soft-rayed part, 3rd or 4th spines longest, 2.6 in head length; no banner-like flap or cirri at spine tips; anal-fin rays III, 6–7, 2nd spine longest, twice length of first spine but shorter than longest anal-fin ray; caudal fin truncate or slightly emarginate, branched rays 15; pectoral fin with 14 or 15 rays, the middle 9–10 rays divided at the tips, the fin length 1.3 in head length, reaching vertical at 2nd anal-fin spine; pelvic fins reaching 3 mm short of anus, 2.0 in head. Body oval; greatest depth 2.6–2.7, head length 2.2, peduncle depth 8 in SL; orbit diameter 3.0, snout 4.7, bony interorbital width 12, all in head length. Lateral-line complete, with 31–34 tubed scales; 1 row of large scales between 5th dorsal-fin spine and lateral-line; circum-peduncular scales missing; head, including interorbital area, snout, lower jaw, distal end of maxilla, interopercle, subopercle, and opercle scaly; cheek with 6 oblique series of large scales. Preopercle posterior edge with 26 large serrae, ventral edge with 2 antrorse spines; subopercle and interopercle with about 4 serrae. Gill-rakers 5–6 / 12.

Fig. 5. *Plectranthias intermedius*, 81 mm SL, holotype, ZIM 5132, 60 miles southwest of Socotra (from Kotthaus 1973).

Live colour not recorded. Colour in alcohol: head and body buff, with a blackish band or series of small dark blotches at base of spinous dorsal fin, continued below soft-rayed part after a gap below dorsal-fin notch; blackish band deflected ventrally onto midlateral part of peduncle; narrow, vertical black bar at caudal-fin base.

REMARKS. Known only from 2 type specimens, 81 and 89 mm SL, from 190–290 m, 60 nautical miles southwest of Socotra. The distinctive black stripe below the dorsal-fin base separates *P. intermedius* from all other species of *Plectranthias*.

Plectranthias klausewitzi Zajonz

Fig. 6

Plectranthias klausewitzi Zajonz 2006: 21, fig. 2 (south end of Red Sea, off Perim Id).

DIAGNOSIS. Dorsal-fin rays X, 14 or 15, the fin margin deeply notched before soft-rayed part; 3rd dorsal spine longest, 1.9–2.3 in head length, with a short cirrus at tip; dorsal-fin spines 4, 5, and 6 also with a shorter cirrus at their tips; penultimate and last dorsal-fin spines subequal, about one-third length of 3rd spine; anal-fin rays III, 7, 2nd spine longest, twice length of first spine, but shorter than longest anal-fin ray; caudal fin emarginate, branched rays 15–17; pectoral-fin rays 14 or 15, most rays branched; fin length 1.4–1.6 in head, reaching vertical at 3rd anal-fin ray; pelvic fins not reaching anus, 1.7–1.9 in head length. Body oblong; greatest depth 2.7–3.1, head length 2.2–2.4 in SL; peduncle depth 3.1–3.3, orbit diameter 3.0–3.4, snout 4.4–5.0, bony interorbital width 10–12, all in head length. Lateral-line complete, with 29 tubed scales; 2 rows of scales between 5th dorsal spine and lateral-line; circum-peduncular scales 11–13; scales on top of head reach almost to rear nostrils; opercle scaly; cheek with 7–8 oblique series of scales; snout, maxilla, suborbitals and lower jaw naked; maxilla with a low ridge along dorsal margin; no supramaxilla. Posterior edge of

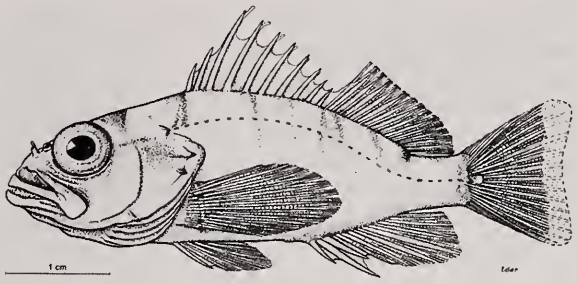

Fig. 6. *Plectranthias klausewitzi*, 45 mm SL, off Perim Id, southern Red Sea (drawn by G. Eder, from Zajonz 2006).

preopercle serrate, ventral edge smooth, or with 2 or 3 minute, recumbent serrae, hidden by skin; subopercle and interopercle smooth. Gill-rakers 3–5 / 11–13. Three supraneural bones: 0/0+0/2/1+1/1/1/1/.

Live colour not recorded. Preserved fish pale, with 9 or 10 faint, narrow, dark oblique bars from dorsal midline of body ventrally.

Remarks. Females mature at 44 mm SL; attains at least 55 mm SL. Known only from seven specimens, 34–54 mm SL, collected from depth of 228–235 m in the Bab al-Mandab Strait at the south end of the Red Sea. We examined a paratype, SAIAB 65098, 39 mm SL.

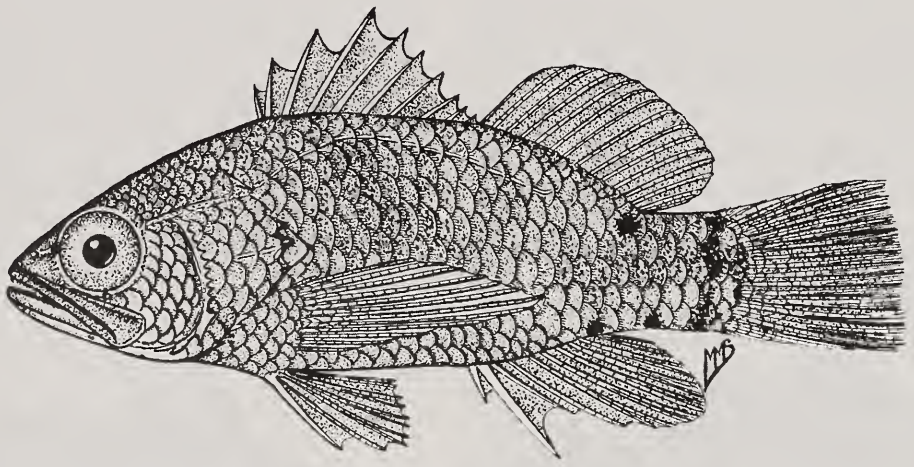

Fig. 7. *Plectranthias longimanus*, 26 mm SL, off Lamu, Kenya, SAIAB 3648 (drawn by M.M. Smith, from Smith 1961).

Plectranthias longimanus (Weber)

Fig. 7, Pl. 1 D

Pteranthias longimanus Weber 1913: 209, fig. 54 (Indonesia: Paternoster Ids); Smith 1961: 366, fig. 4.

Plectranthias longimanus: Randall 1980: 148, fig. 16 (redescription based on four syntypes, 20 mm SL fish designated as the lectotype; new data from six fish from Kenya, one from Grand Comoro Id and numerous specimens from the western central Pacific); Heemstra & Randall 1986: 514 (diagnosis, Fig. 166.16, drawing, Plate 34, colour photograph); Winterbottom et al. 1989: 28, Fig. 151 (monochrome photograph of 12-mm SL juvenile); Randall 1996: 129 (new records from the Pacific and Seychelles); Kuiter 2004: 112 (colour photographs of three live Pacific fish).

Diagnosis. Dorsal-fin rays X, 13–15, the fin margin divided to the base before soft-rayed part, 4th spine longest, 1.9–2.5 in head length; anal-fin rays III, 6–7, 2nd spine longest, twice length of first spine but shorter than longest anal-fin ray; caudal fin truncate to slightly rounded, branched rays 13–15; pectoral-fin rays 12–13, unbranched; fin length 1.0–1.3 in head, reaches vertical at 5th anal-fin ray; pelvic fins not reaching anus, 1.7–1.9 in head. Body oblong; greatest depth 2.6–3.1, head length 2.2–2.4 in SL; peduncle depth 2.9–3.3, orbit diameter 3.0–3.4, snout 4.4–5.0, bony interorbital width 10–12, all in head length. Lateral-line incomplete, ending below dorsal-fin rays, with 12–15 tubed scales, 1 row of scales from 5th dorsal spine to lateral-line; circumpeduncular scales 12; scales on top of head reach middle of interorbital space; operculum scaly; cheek with 4 oblique series of large scales; snout, maxilla, suborbitals and lower jaw naked. Maxilla with a low ledge along entire dorsal margin and no supramaxilla. Preopercle posterior edge with about 12 small serrae; lower edge with 2 well-separated antrorse spines, subopercle and interopercle serrate. Gill-rakers 4–6 / 9–12. Two supraneural bones: 0/0/2/1+1/1/1/1/.

Fresh colour of 23 mm SL fish from the Comoros: body pale, with longitudinal series of brown zigzag stripes; a square black spot at base of upper and lower 6 caudal fin rays, followed posteriorly by a golden yellow spot above and below a smaller black spot on upper

and lower middle caudal rays; a black spot on each side of a white spot at base of anal fin rays; proximal part of dorsal fins reddish brown; dorsal-fin spines 4 to 7 with red tips; a dark brown square blotch at base of last 6 dorsal-fin rays; several small, irregular white spots randomly scattered over head and body; ventral part of abdomen and head white; snout and front of lower jaw reddish brown.

REMARKS. Females mature at about 19 mm SL, males at about 23 mm SL; attains 29 mm SL. Depth range: 6–73 m. *Plectranthias longimanus* is widely distributed on coral reefs of continental areas and various island groups of the Indo-West Pacific region: known from South Africa (KwaZulu-Natal), Mozambique, Kenya, Madagascar, Comoros, Seychelles and Chagos to Indonesia, Philippines, Taiwan, Japan (Honshu and Okinawa), New Caledonia, Fiji, Caroline, Marshall, Loyalty and Solomon Islands. Common in scuba-rotenone collections on coral reefs.

Plectranthias maugei Randall
Fig. 8

Plectranthias maugei Randall 1980: 152, fig. 18 (Madagascar, off Tuléar, depth 250 m).

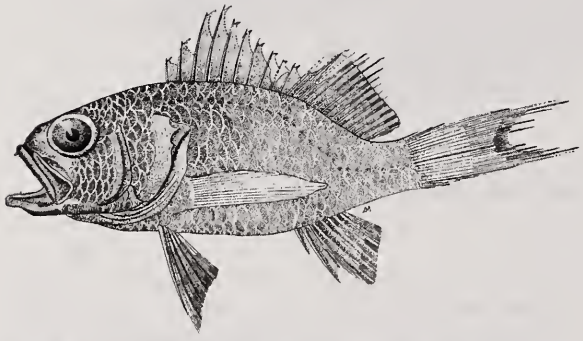

Fig. 8. *Plectranthias maugei*, 56 mm SL, holotype, off Madagascar, MNHN 1978-83 (drawn by L. A. Maugé, from Randall 1980).

DIAGNOSIS. Dorsal-fin rays X, 15 (not 16, as given in the key for *P. maugei* in Randall, 1980), the fin margin moderately notched before soft-rayed part, the 4th spine longest, 2.2–2.3 in head length, (3rd spine as long in one of two paratypes); a short cirrus behind tip of each dorsal-fin spine, and some dorsal-fin soft rays are exserted; anal-fin rays III, 7, 2nd spine longest, twice length of first spine but shorter than longest anal-fin ray; caudal fin lunate, branched rays 14, the upper and lower caudal rays elongated; pectoral-fin rays 13, unbranched, the fin length 1.0–1.1 in head length, reaches vertical at 5th anal-fin ray; pelvic fins not reaching anus, 1.6–1.7 in head length. Body deep; greatest depth 2.6–2.7, head length 2.3–2.4 in SL; peduncle depth 3.3–3.6, orbit diameter 3.5–3.6, snout 4.9–5.0, bony interorbital width 9.3–10, all in head length. Lateral-line complete, with 29–30 tubed scales; 2 rows of scales between 5th dorsal spine and lateral-line; circum-peduncular scales 14; scales on top of head reach almost to rear nostrils; opercle scaly; cheek with 6 oblique series of large scales; snout, maxilla, suborbitals and lower jaw naked. Preopercle posterior edge with 23–29 minute serrae, ventral edge, subopercle and interopercle smooth. Gill-rakers 5 / 11 or 12.

Live colour not recorded.

REMARKS. Known only from the three type specimens (51–58 mm SL) trawled southwest of Madagascar in 250 m.

Plectranthias morgansi (Smith)
Fig. 9, Pl. 1 E

Pelontrus morgansi Smith 1961: 365, Fig. 3 (Kenya: off Lamu in ~ 80 m); Kotthaus 1973: 26, Fig. 291 (1 specimen from off Mombasa in 208–267 m).

Plectranthias morgansi: Randall 1980: 158, Fig. 21 (copy of original drawing). Heemstra & Randall 1986: 514, fig. 166.17 (copy of original drawing, also Plate 34, fig. 166.17 colour photograph of fresh 48 mm SL fish from off Kenya), three specimens from 138 m off South Africa; Kuiter 2004: 113 (colour photograph of fish from Kenya).

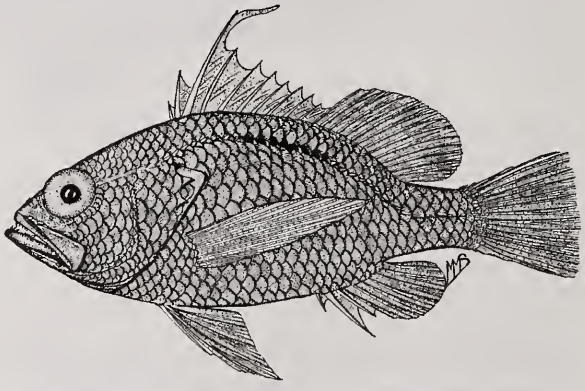

Fig. 9. *Plectranthias morgansi*, 37 mm SL, holotype, off Kenya, SAIAB 134 (drawn by M.M. Smith, from Smith 1961).

DIAGNOSIS. Dorsal-fin rays X, 13–15, the fin margin slightly notched before soft-rayed part, the 3rd spine longest, 22–26% SL, 1.7–2.3 in head length, with a long white, banner-like flap (about half spine length) behind tip of spine; anal-fin rays III, 7–8, 2nd spine longest, twice length of first spine and subequal to longest anal-fin ray; caudal fin truncate, but upper branched rays slightly produced, the branched rays 14–15; pectoral-fin rays 13 or 14, usually unbranched (2 specimens, 36 and 38 mm SL, have 3 or 4 middle pectoral rays bifurcate at tips), fin length 1.0–1.2 in head and reaching to between verticals at anal-fin origin and 5th anal-fin ray; pelvic fins not reaching anus, 1.6–1.7 in head length. Body oval; greatest depth 2.4–2.6, head length 2.2–2.4

in SL; peduncle depth 3.1–3.6, orbit diameter 3.0–3.7, snout 4.7–5.7, bony interorbital width 8.1–12, all in head length. Lateral-line complete, with 28–30 tubed scales; 1or 2 rows of scales between 5th dorsal-fin spine and lateral-line; circum-peduncular scales 14; scales on top of head reach to rear nostrils; opercle scaly; cheek with 4–5 oblique series of large scales; snout, maxilla, suborbitals and lower jaw naked. Proximal two-thirds of maxilla with a low narrow ledge along dorsal margin; supramaxilla rudimentary or absent. Preopercle rounded, finely serrate, no antrorse spines on ventral edge, subopercle smooth or with a few serrae, interopercle distinctly serrate. Gill-rakers 4–6 / 11–12. Three supraneural bones: 0/0+0/2/1+1/1/1/. Colour (from photograph of a 48 mm fresh fish with most body scales missing): Head and body reddish orange dorsally, with scattered irregular yellow blotches; red blotch at mid-spinous dorsal fin, continued ventrally as a wide oblique reddish orange band across 6 darkly pigmented lateral-line scales, the band becoming fainter on ventral 3rd of body; interspinous membranes of first 3 dorsal-fin spines white, and extended as a white banner-like flap behind tip of 3rd spine. Preserved specimens buff, dusky areas on nape and below rear half of spinous dorsal fin; lateral-line scales 9 to 16 darkly pigmented.

Remarks. We examined seven specimens, 28–48 mm SL. Depth range 80–267 m. Known from South Africa (off Mtentu River, Eastern Cape Province; Scottburgh and Park Rynie, KwaZulu-Natal Province) and Kenya (off Lamu, Malindi and Mombasa).

Plectranthias nanus Randall

Fig. 10

Plectranthias nanus Randall 1980: 159, Fig. 22 (Guam, Mariana Ids.); Randall 1994: 261, Fig. 1 (2 specimens, 15 & 16 mm SL, new record for Red Sea); Randall 1996: 129 (new records from Pacific); Kuiter 2004: 112 (colour photograph of fresh fish from Christmas Id, Indian Ocean).

Diagnosis. Dorsal-fin rays X, 16 (rays 13–15 in Pacific fish), the fin margin notched almost to the base before soft-rayed part, 4th spine longest, 2.5–3.0 in head length; no banners or cirri at tips of dorsal-fin spines; anal-fin rays III, 6–7, 2nd spine longest, twice length of first spine, but shorter than first ray; caudal fin rounded, with 13–15 branched rays; pectoral-fin rays 14–16, fin length 2.5-3.2 in SL and reaching to between verticals at anal-fin origin and 3rd anal-fin ray; pelvic fins not reaching anus, 2.3–2.6 in head. Body oblong, greatest depth 2.9–3.6, head length 2.2–2.6 in SL; peduncle depth 2.9–3.3, orbit diameter 3.4–4.0, snout 4.5–4.7, all in head length. Lateral-line incomplete, with 15 tubed scales ending below soft dorsal-fin rays, and a mid-lateral series of pored scales on peduncle; circum-peduncular scales 14; 1 row of large scales between 5th dorsal spine and lateral-line; scales on top of head

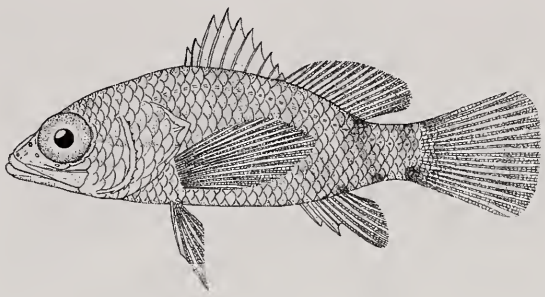

Fig. 10. *Plectranthias nanus*, 16 mm SL, Khor Obhour, Saudi Arabia, Red Sea, ANSP 162460 (drawn by T. Shimizu, from Randall 1994).

reach mid interorbital area; cheek with 4–5 oblique series of large scales; snout, maxilla, suborbitals and lower jaw naked. Maxilla reaches vertical at rear edge of eye; supramaxilla rudimentary or absent. Preopercle rounded, with 4–17 coarse serrae dorsally, ventral edge with 2 antrorse spines, subopercle and interopercle smooth or with a few weak serrae. Gill-rakers 4–6 / 11–14, including rudiments.

According to Randall (1980): "The complex colour pattern of *P. nanus* is remarkably similar to that of *P. longimanus*, the latter differing mainly in lacking the narrow dark vertical band on the caudal [fin] base".

Remarks. The two Red Sea *P. nanus* were collected in 23 m with rotenone by William F. Smith-Vaniz. The species is widely distributed in the Pacific Ocean (Randall 1980, 1994). Except for the two Red Sea fish, it has not been found in the Western Indian Ocean.

Plectranthias pelicieri Randall & Shimizu

Fig. 11

Plectranthias pelicieri Randall & Shimizu 1994: 109, figs 1 & 2 (Mauritius; colour photographs of live fish); Heemstra 1996: 143 (diagnosis; data from two Mauritius specimens); Kuiter 2004: 110 (six colour photographs of live fish).

Diagnosis. Dorsal-fin rays X, 15 or 16, the fin margin deeply notched before soft-rayed part, 3rd spine longest, 19–26% SL, 2.0–2.3 in head length, a fleshy banner (~ half spine length) at tip of 3rd dorsal-fin spine and a shorter cirrus at tips of spines 4–7; anal-fin rays III, 7, 2nd spine slightly longer than 3rd spine and half of longest anal-fin ray; caudal fin emarginate, branched rays 14–15; pectoral-fin rays 13–14, unbranched; fin length 1.0–1.2 in head and reaching to between verticals at 3rd anal-fin spine and 5th anal-fin ray; pelvic fins reaching to anus, 1.6–1.7 in head. Body oblong, greatest depth 2.6–2.9, head length 2.2–2.4 in SL; peduncle depth 3.1–3.6, orbit diameter 3.0– 3.8, snout 4.7–5.7, bony interorbital width 8.1–12, all in head length. Lateral-line complete, with 28–30 tubed scales; 2 rows of scales

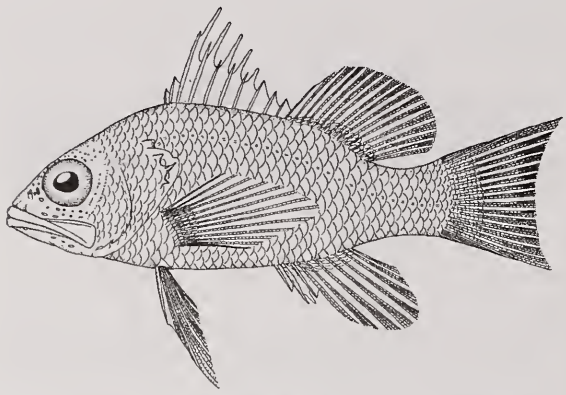

Fig. 11. *Plectranthias pelicieri*, 40 mm SL, holotype, BPBM 34646 (drawn by T. Shimizu, from Randall & Shimizu 1994).

between 5th dorsal spine and lateral-line; circum-peduncular scales 14; interorbital and top of head naked; opercle scaly; cheek with 4–5 oblique series of large scales, the 5th series mostly covered by scales of the 4th series; snout, maxilla, suborbitals and lower jaw naked. Maxilla with well developed ledge along dorsal margin; supramaxilla well developed, rudimentary or absent. Preopercle rounded, finely serrate, lower edge with a ventrally-directed spine at rounded corner and 2–3 separate antrorse spines anteriorly, hidden by skin; subopercle smooth or with a few serrae; interopercle distinctly serrate anteriorly. Gill-rakers 4–6 / 11 or 12. Three supraneural bones: 0/0+0/2/1+1/1/1/.

Randall and Shimizu (1994: Fig. 2) illustrated a live fish in an aquarium. The body is reddish, shading to orange-yellow on abdomen and above front of anal fin, with several vertical pale blue, lavender or chalky white streaks (edged with red on lower part of body); a pale diffuse whitish zone below dorsal fin, with a series of 10 red spots along fin base; caudal fin pale greenish yellow with 4 red spots at base; anal fin with red spots proximally and dull gold spots distally. Head dull golden yellow, with irregular red streaks, 3–5 pale pink or white spots on cheeks and below eye, and a yellow-edged red ocellus on opercle. The cirri on the dorsal-fin spines are greyish brown.

REMARKS. Females are mature at about 34 mm SL, males at about 40 mm SL. In addition to the type specimens, we examined five specimens, 22–44 mm SL, from South Africa (off KwaZulu-Natal) and seven specimens, 27–46 mm SL from Mauritius. A 35-mm SL fish contained a large ovary with ripe ova; our largest fish, 44 mm SL, is a male with well-developed testes. Depth range 50–95 m. In the Indian Ocean this species is known from Mauritius and South Africa (northern KwaZulu-Natal). It probably also occurs off Madagascar and Mozambique at comparable depths. Colour photographs of live *Plectranthias pelicieri* from the Izus and Ryukyus Islands were published by Senou & Yunokawa 1995.

Plectranthias vexillarius Randall

Fig. 12

Plectranthias vexillarius Randall 1980: 173, Fig. 27 (Gulf of Oman); Randall 1995: 123, Fig. 271 (synopsis of original description; copy of original photograph of preserved holotype).

Fig. 12. *Plectranthius vexillarius*, 82 mm SL, holotype, USNM 213545, Gulf of Oman (from Randall 1980).

DIAGNOSIS. Dorsal-fin rays X, 17, the fin margin slightly notched before soft-rayed part, 3rd spine longest, 24% SL, 2.1 in head length; last spine 1.5 times in length of first dorsal-fin ray; a long banner-like flap (~ half spine length) behind tip of 3rd dorsal-fin spine and a shorter cirrus behind tips of other dorsal-fin spines; anal-fin rays III, 7, 2nd spine slightly longer than 3rd spine and half of longest anal-fin ray; caudal fin emarginate, branched rays 15; pectoral-fin rays 13, unbranched; fin length 2.5 in SL and reaching to vertical at last anal-fin ray; pelvic fins reaching slightly past anus, 1.8 in head length. Body oblong, greatest depth 2.7, head length 2.1 in SL; peduncle depth 3.1–3.6, orbit diameter 3.0–3.8, snout 4.7–5.7, bony interorbital width 8.1–12, peduncle depth 4.1, all in head lengh. Lateral-line complete, with 28 tubed scales; 2 rows of scales between 5th dorsal-fin spine and lateral-line; circum-peduncular scales 14; interorbital scales extend almost to nostrils; opercle scaly; cheek with 7 oblique series of large scales; snout, maxilla, suborbitals and lower jaw naked. Preopercle rounded, with 33 fine serrae, ventral edge irregular, without distinct spines; subopercle and interopercle smooth. Gill-rakers 6 / 13. Two supraneural bones: /0+0/2/1+1/1/1/1/.

Fresh colour unknown. In alcohol: Body pale, with 4 irregular rows of large brown blotches (some eye-size); dorsal blotches roundish, with pale centre or U-shaped; nape and upper rear part of head with brown blotches; faint brown band from mideye to opercle and another band extending posteriorly from lower part of eye.

Known only from the 82 mm holotype collected in the Gulf of Oman from 49–63 m.

Plectranthias winniensis (Tyler)
Fig. 13

Pteranthias winniensis Tyler 1966: 2, Fig. 1 (Seychelles, St. Joseph Id, Amirante Group).

Plectranthias winniensis: Randall 1980: 182, Fig. 31; Heemstra & Randall 1986: 515, Fig. 166.18 (diagnosis, drawing of head); Randall & Anderson 1993: 14 (report of lost specimen). Heemstra 1996: 144, Fig. 1B (redescription based on nine additional fish, colour photograph of 26-mm SL fresh fish from Mauritius, others from Grand Comoro Id, Mauritius and South Africa: KwaZulu-Natal); Randall 1996:129 (new records from Pacific); Kuiter 2004: 112 (colour photograph of fresh fish from Aliwal Shoal, South Africa).

Fig. 13. *Plectranthias winniensis*, 38 mm SL, SAIAB 56572, Margate, South Africa (photo by P. C. Heemstra).

Diagnosis. Dorsal-fin rays X, 15–17, the fin margin notched almost to the base before soft-rayed part, 4th spine usually longest, 14–17% SL, 2.4–3.1 in head length. No banner or cirrus at tip of dorsal-fin spines; anal-fin rays III, 7, 2nd spine slightly longer than 3rd spine; caudal fin rounded, branched rays 13; pectoral-fin rays 16–18, unbranched; fin length 1.0–1.7 in head and reaching to between verticals at 2nd anal-fin spine and 3rd anal-fin ray; pelvic fins reaching 1–3 mm less than anus, 1.5–1.8 in head. Body oblong, greatest depth 2.8–3.2, head length 2.3–2.4 in SL; peduncle depth 2.9–3.7, orbit diameter 3.0–2.7, snout 4.4–5.7, bony interorbital width 10–11 in head. Lateral-line incomplete, with 8–27 tubed scales ending below soft dorsal fin; 1–2 rows of scales between 5th dorsal-fin spine and lateral-line; circum-peduncular scales 13–14; top of head scaly to mid interorbital area; cheek with 4–5 oblique series of large scales, the 5th series mostly covered by scales of the 4th series; snout, maxilla, suborbitals and lower jaw naked. Supramaxilla rudimentary or absent. Preopercle rounded, finely serrate, lower edge with 2 antrorse spines hidden by skin; subopercle and interopercle with 0–2 weak serrae. Gill-rakers 4–6 / 11–15. Three supraneural bones: 0/0+0/2/1+1/1/1/1/.

Head and body russet to reddish orange, with dusky scales dorsally; abdomen yellow-orange; dorsal and anal fins yellow proximally, transparent distally with pale pink rays; red blotch at base of last three anal-fin rays and at base of first three dorsal-fin spines; caudal fin transparent, the rays silvery red; white-edged red spot at base of lower six rays.

Remarks. Females mature at about 31 mm SL. Found on outer reefs in depths of 23–28 m. Widely distributed from the Gulf of Aqaba in the Red Sea to Hawaii and the Tuamotu Ids; in the Indian Ocean, *P. winniensis* is known from the Red Sea, South Africa (Sodwana Bay, Leadsman Shoal, Landers Reef off Park Rynie and Margate, KwaZulu-Natal), Grand Comoro Id, Seychelles, Maldives and Mauritius.

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We are grateful to Helen Randall and Elaine Heemstra for their careful review of the manuscript. Thomas Hecht provided specimens of *Plectranthias gardineri* from Mahé, Seychelles. Daniel Pelicier donated specimens from Mauritius. Allan Connell, Richard Kilburn and Clive Potter collected specimens from South Africa; William Smith-Vaniz collected two *P. nanus* from the Red Sea. The crew of the Norwegian research vessel R/V *Dr Fridtjof Nansen* collected *P. morgansi* from off the coast of Kenya in 1980. Mark Sabaj provided information on *Plectranthias nanus*.

MATERIAL EXAMINED

Except for type specimens, the material listed here does not include specimens previously listed by Heemstra and Randall (1986), Heemstra (1996), Randall (1980), Randall and Shimizu (1994). Measurements are standard lengths.

Plectranthias gardineri. **Seychelles**, Amirante Ids: BMNH 1908.3.23.62, 28.5 mm, lectotype; BMNH 1908.3.23.63–6, 38 mm, paralectotype; Mahé: SAIAB 62607, 6: 24–33 mm.

Plectranthias klausewitzi. **Red Sea**, Perim Id: SAIAB 65098, 39 mm, paratype.

Plectranthias longimanus. **South Africa**, KwaZulu-Natal, Kosi Bay: SAIAB 11798, 23 mm; SAIAB 28199, 2: 22 & 24 mm. Sodwana Bay: SAIAB 8849, 25 mm; SAIAB 9289, 2: 19 & 24 mm; SAIAB 9622, 23 mm; SAIAB 64628, 28 mm. Leadsman Shoal: SAIAB 15967, 2: 23 & 25 mm. Aliwal Shoal: SAIAB 59772, 27 mm; SAIAB 62122, 25 mm. **Comoro Ids**: SAIAB 39457, 18 mm. **Seychelles**, Amirante Ids: ANSP 106344, 3: 19, 20, 23 mm.

Plectranthias morgansi. **Kenya**, off Lamu, SAIAB 134, 35 mm, holotype; SAIAB 806, 28 mm paratype; Mombasa: SAIAB 13875, 48 mm. **South Africa**, KwaZulu-Natal, Aliwal Shoal: SAIAB 82758, 24 mm. Park Rynie: SAIAB 15929, 37 mm. Eastern Cape Province, off Mtentu River: SAIAB 20025, 36 mm.

Plectranthias nanus. **Red Sea,** Saudi Arabia: ANSP 162460, 16 mm.

Plectranthias pelicieri. **South Africa**, KwaZulu-Natal, Sodwana Bay: SAIAB 28208, 2: 35 & 44 mm. Kosi Bay, BPBM 32807, 41 mm; SAIAB 28206, 38 mm; SAIAB 28207, 22 mm. **Mauritius**: SAIAB 51837, 31 mm; SAIAB 56847, 3: 21, 41, 46 mm.

Plectranthias winniensis. **South Africa**, KwaZulu-Natal, Sodwana Bay: SAIAB 17261, 19 mm; SAIAB 63074, 30 mm; SAIAB 64545, 22 mm. Leadsman Shoal: SAIAB 15968, 23 mm; Aliwal Shoal: SAIAB 46426, 38 mm; SAIAB 59732, 34 mm; SAIAB 60215, 31 mm; SAIAB 62202, 40 mm. Landers Reef, Park Rynie: SAIAB 40445, 33 mm; SAIAB 59785, 25 mm; SAIAB 61157, 37 mm. **Mauritius**: SAIAB 51836, 29 mm; SAIAB 52689, 2: 20 & 22 mm. **Gulf of Aqaba**, Ras Abu Galum, Sinai Peninsula: HUJF 8324, 8: 22–30 mm.

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PLATE 1

A. *Plectranthias gardineri*, 33 mm SL, BPBM 35487, off Bird Island, Seychelles (photo J. Randall).

B. *Plectranthias inermis,* 38 mm SL, BPBM 24777, Mauritius (photo J. Randall).

C. *Plectranthias inermis*, 45 mm SL, SAIAB 51834, Mauritius (photo P. Heemstra).

D. *Plectranthias longimanus, 28* mm SL, SAIAB 59772, South Africa (photo P. Heemstra).

E. *Plectranthias morgansi*, 48 mm SL, SAIAB 13875, Kenya (photo P. Heemstra).

F. *Plectranthias pelicieri*, Mauritius (photo T. Shimizu)

G. *Plectranthias pelecieri*, 43 mm SL, SAIAB 51837, Mauritius (photo P. Heemstra)

H. *Plectranthias winniensis*, 28 mm SL, South Africa, SAIAB 63074 (photo P. Heemstra).

Hippocampus tyro, a new seahorse (Gasterosteiformes: Syngnathidae) from the Seychelles

John E. Randall[1] and Sara A. Lourie[2]

[1]Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA
[2]Redpath Museum, McGill University, 859 Sherbrooke West, Montréal, Québec, H3A 2K6, Canada

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Abstract. *Hippocampus tyro* is described as a new species of seahorse from one specimen, 34 mm high and 61 mm in total length, dredged from 43–48 m off Poivre Atoll, Seychelles in 1992. It is unique for the genus in having 14 trunk rings and a single middorsal gill opening. It is compared with two other diminutive species, *H. pusillus* Fricke and *H. jugumus* Kuiter, sharing with them a slender body, confluent middorsal shoulder ridges, and similar spination.

Keywords: Syngnathidae, *Hippocampus*, new species, Seychelles

INTRODUCTION

The first author was fortunate to be a participant in a marine biological expedition to the Seychelles aboard the Dutch research vessel *Tyro* in 1992 (van der Land 1994). Fishes were collected in offshore stations by trawls and dredges, and inshore with the use of the ichthyocide rotenone, the anaesthetic quinaldine sulphate, and by spearing. The expedition resulted in the collection of 374 species of fishes, of which 108 were new records for the Seychelles (Randall & van Egmond 1994).

Station 766 was a haul by a rectangular dredge on the north side of Poivre Atoll in the Amirantes at a depth of 43–48 m. A single small specimen of a seahorse was among the fragments of the corals *Stylophora pistillata*, *Montipora digitata* and *Dendrophyllia* sp. taken in the haul. A colour photograph was taken (Fig. 1), and the specimen was deposited in the Bishop Museum in Honolulu (BPBM) as *Hippocampus* sp.

When the specimen could not be identified to species in the review of seahorses by Lourie et al. (1999), it was sent on loan to the second author. Although it keys to the genus *Hippocampus* in Dawson (1985) and Dawson in Smith and Heemstra (1986) by having a prehensile tail and the head angled ventrally by more than 70°, its slender body form and the high number of trunk and tail rings suggested a relationship to the pipehorse genus *Acentronura*. After initial attempts at DNA sequencing by the second author, the specimen was sent to a colleague who was willing to try using a different protocol, in spite of the initial preservation in formalin. The tissue yielded only a conclusion that the specimen is a syngnathid. Regrettably, the tissue samples taken from the specimen resulted in the loss of the viscera, the anal fin, and most of the muscle of the proximal half of the tail.

A large collection of fishes was made during a recent expedition to the Seychelles by the South African Institute for Aquatic Biodiversity. We have checked with this institution for possible additional material of this seahorse. Unfortunately, no specimens of *Hippocampus* were collected, so we describe the species here from the single specimen.

Proportional measurements, rounded to the nearest 0.05, are related to the head length (HL), measured from the tip of the snout to the most posterior edge of the shoulder ridge, or the total length (TL), determined by bending a slender wire to the shape of the specimen, straightening the wire, and measuring its length. Total length is equivalent to standard length as defined by Lourie et al. (1999). Trunk length was measured by bending a wire from the anterior edge of the first trunk ring along the lateral trunk ridge to the anterior edge of the first tail ring. The first trunk ring is the one bearing the pectoral-fin base, and the last trunk ring, much deeper than the first tail ring, contains the anus. The measurements of maximum depth of the trunk and tail were made from the outer edge of the superior median trunk or tail ridge to the median ventral or tail ridge

Hippocampus tyro sp. nov.

Figs. 1–2

Holotype. BPBM 35555, female, 61 mm TL, Seychelles, Amirantes, north end of Poivre Atoll, 5°44'S, 53°20'E,

coarse calcareous sand and coral, 43–48 m, rectangular dredge, R/V *Tyro* Station 766, J. van der Land et al., 29 December 1992.

Fig. 1. Holotype of *Hippocampus tyro*, BPBM 35555, 61 mm total length, Poivre Atoll, Amirantes, Seychelles.

Diagnosis. Dorsal rays 15; pectoral rays 14 or 15; trunk rings 14; tail rings 38; subdorsal rings 3; subdorsal spines 4, forming a square, the dorsal 2 enlarged; spines of trunk and tail ridges blunt and moderate in size; third and seventh superior trunk spines, and fourth, eighth, and eleventh superior tail spines enlarged, with a slender, leaf-like filament; body slender, the maximum trunk depth (at seventh trunk ring) 11.2 in TL; depth of tail at third tail ring 23 in TL; trunk length 3.2 in TL; head at right angle to trunk as photographed (80° in preserved specimen); head length 6.2 in TL; snout length 2.2 in HL; eye diameter 6.25 in HL; one suborbital, 2 supraorbital, and 2 nose spines; coronet oval and cup-like in dorsal view, with a rugose spine to each side, followed by a narrow median ridge; anterior edges of coronet converging to a low, arrow-like, median spine; shoulder ridge continuous middorsally, followed by crest-like ridge; gill opening a single middorsal slit in neck ridge between coronet and collar of shoulder ridge; colour in preservative uniform greyish white; colour when fresh light brown with whitish blotches, grading to light orangish brown posteriorly on tail, and to whitish ventrally on head and trunk; trunk and tail ridge spines white; filaments on spines dark brown.

Description. Dorsal rays 15; pectoral rays 14 (15 on right side); trunk rings 14; tail rings 38; subdorsal rings 3; superior trunk ridge ending under dorsal fin with 2 enlarged subdorsal spines that angle posterolaterally; superior tail ridge commencing with 2 small subdorsal spines in alignment with larger subdorsal spines above; lateral trunk ridge continuous with inferior tail ridge; spines of trunk and tail ridges moderate in size and blunt; first 8 dorsal trunk spines as double spines; third and seventh superior trunk spines and fourth, eighth, and eleventh superior tail spines enlarged (counts of tail spines include anterior 2 subdorsal spines); a slender, leaf-like, branching filament up to an eye diameter in length on enlarged superior trunk and tail spines; superior trunk spines anterior to dorsal fin linked across back by a low double ridge; spines of superior tail ridge progressively smaller posteriorly, disappearing posterior to 26th tail ring; spines of inferior tail ridge not detected posterior to 12th tail ring; body slender, the maximum trunk depth (seventh trunk ring, between spines) 11.2 in TL; depth of tail at third tail ring 25.5 in TL; trunk length 3.2 in TL; head at right angle to trunk as photographed (80° in preserved specimen); head length 6.2 in TL; head depth from just posterior to coronet (hence at gill opening) to base of cheek spine (as defined by Lourie et al., 1999: fig. 4) 1.65 in HL; snout length 2.2 in HL; minimum snout depth 7.5 in HL; maximum snout depth 4.5 in HL: eye diameter

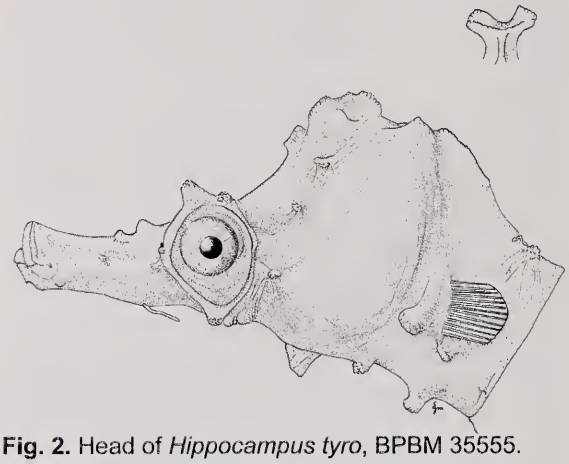

Fig. 2. Head of *Hippocampus tyro*, BPBM 35555. (Drawn by Susan Monden.)

6.25 in HL; 2 supraorbital spines, angling laterally, the anterior twice as long as posterior, slightly longer than pupil diameter; one suborbital spine, intermediate in length to the 2 supraorbital spines; 2 median dorsal nose spines basally on snout, the posterior twice as large, its length about equal to second supraorbital

spine; a transverse pair of blunt spines ventrally on head slightly posterior to suborbital spine; coronet well-developed, its height 9.4 in HL; coronet oval and cup-like in dorsal view, with a rugose spine projecting to each side, followed by a narrow median ridge; anterior edges of cup descending and converging to a low, arrow-like, median spine; 2 small spines in a vertical row ventral to coronet and above level of upper edge of orbit; shoulder (cleithral) ridge continuous middorsally, followed by a prominent, crest-like, median ridge; gill opening a narrow middorsal slit in neck ridge between median posterior ridge of coronet and collar of shoulder ridge; a large, truncate, rugose spine on shoulder ridge anterior to ventral third of pectoral-fin base; cheek spine on shoulder ridge ventrally on head nearly half way to large V-shaped midventral head spine; a prominent midventral spine on first trunk ring; ventral trunk keel nearly as deep as pupil diameter; longest dorsal ray 3.1 in HL; longest pectoral ray 4.2 in HL. Colour in alcohol uniform greyish white, only the very small filament on enlarged superior and tail ridges brown. Colour when fresh as in Fig. 1.

Etymology. This little seahorse is named for the Dutch R/V *Tyro*, in recognition of the vessel serving as the base for a very successful marine biological expedition to the Seychelles.

Remarks. *Hippocampus tyro* is unique among known species of seahorses in having 14 trunk rings (8–13 in other species) and a single, slit-like, middorsal gill opening. It is most similar to *H. pusillus* Fricke 2004, described from three specimens, 28.3–39.0 mm in height, collected from 35–228 m off New Caledonia and the Loyalty Islands; and to *H. jugumus* Kuiter, 2001 known from one specimen, 44 mm in height, from Lord Howe Island. *H. tyro* shares with both a slender body, confluent shoulder ridges, and similar (though blunter) spination. It differs from *H. pusillus* in the much greater head depth, 38 vs. 34 tail rings, and 14 or 15 instead of 12 or 13 pectoral rays. *H. jugumus* differs in having 12 trunk rings, 37 tail rings, 20 dorsal rays, a prominent branching supraorbital spine, and a longer snout.

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A pictorial review and key to the shrimp gobies of the genus *Amblyeleotris* of the Red Sea, with description of a new species

Zeehan Jaafar [1] and John E. Randall[2]

[1]Department of Biological Sciences, 14 Science Drive 4,
National University of Singapore, Singapore 117543
[2]Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA

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Abstract. Fishes of the gobiid genus *Amblyeleotris* live in symbiotic relationship with snapping shrimps of the genus *Alpheus*. Five species of this genus have been previously recorded from the Red Sea. We here describe a sixth species, *Amblyeleotris neglecta* sp. nov., at present known only to occur in the Red Sea. This new species can be distinguished by the following suite of characters: dorsal fin rays VI + I,12–14; anal fin rays I,13–15; pectoral fin rays 18–19; presence of pelvic frenum, fifth pelvic fin ray slightly shorter than fourth, longitudinal scale series 77–85; median predorsal scales 16–17; one dark bar on nape, four on body; pale interspaces with an irregular dark brown line; branchiostegal membranes dark brown; caudal fin with a dark brown arc at base. A key to the species of *Amblyeleotris* occurring in the Red Sea is included.

Keywords: *Amblyeleotris*, new species, Red Sea

INTRODUCTION

There are 13 genera of gobiid fishes occurring in symbiotic association with shrimps from the genus *Alpheus*. Of these, the genus *Amblyeleotris* Bleeker 1874, is the most speciose with a current total of 36 species; 35 species noted in a review by Chen et al. (2006) and one species later described by Senou and Aonuma (2007). The shrimp constructs and maintains a burrow in sedimentary substratum that is used by the goby as a refuge. The goby serves as a sentinel, warning the shrimp of the approach of a predator by occluding the burrow entrance, and/or by rapid fluttering of the caudal fin (Karplus, 1987). When leaving the burrow entrance, the shrimp generally maintains contact with the goby with one antenna. It is hypothesized that alarm signals are conveyed via these contact points (Yanagisawa, 1976).

Early records from the Red Sea included two species of the genus *Amblyeleotris*, *A. sungami* (Klausewitz, 1969) and *A. steinitzi* (Klausewitz, 1969) (Dor 1984; Goren and Dor 1994). Randall (1994a) increased this number to five by the inclusion of the following three species to the ichthyofauna of the area; *A. diagonalis* Polunin and Lubbock, 1979 (page 245, fig. 4), *A. wheeleri* (Polunin and Lubbock, 1977) (page 88, figs. 16-17) and *A. triguttata* Randall, 1994 (pages 321, pls. 5-9). We describe here a new species of *Amblyeleotris* collected off Eilat in the Gulf of Aqaba, followed by a key to the six Red Sea species of the genus: *A. neglecta* nov. sp. (Plate 1 A-C); *A. diagonalis* (Plate 1 D-F); *A. steinitzi* (Plates 1 G-H, 2A); *A. sungami* (Plate 2 B-D); *A. triguttata* (Plate 2 E-F) and *A. wheeleri* (Plate 2 G-H).

MATERIALS AND METHODS

Specimens examined in this study are lodged at the Bernice P. Bishop Museum, Honolulu (BPBM); the South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB); Senckenberg Museum, Frankfurt (SMF), and the National Museum of Natural History, Washington D.C. (USNM). Measurements and counts were made following Randall (2004). Lengths of all specimens are given in standard length (SL) and the head length is abbreviated as HL when used in proportions. Measurement of the length of the first dorsal fin is made from the base of the first dorsal spine, past the sixth dorsal spine, to the point of attachment of the first dorsal fin membrane to the dorsum. Values obtained from the holotype are provided in the description with range values of paratypes given within parentheses.

Amblyeleotris neglecta sp. nov.

Fig. 1, Plate 1 A–C, Table 1

Holotype. BPBM 18291, female, 54.0 mm, off desalination plant, Eilat, Gulf of Aqaba, Red Sea, 15 m, spear, J.E. Randall, 28 September 1974.

Paratypes. BPBM 19893, male, 34.0 mm, locality as holotype, 15 m, spear, J.E. Randall, 3 November 1975; SAIAB 80947, male, 31.8 mm, locality as holotype, 15 m, rotenone, J.E. Randall, 28 September 1974.

Diagnosis. Dorsal fin rays VI + I,12–14; anal fin rays I,13–15; pectoral fin rays 18–19; pelvic fin rays I, 5, pelvic fins joined basally by a membrane, pelvic

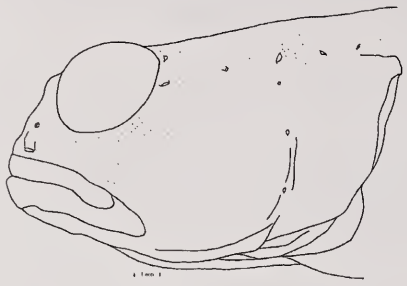

Fig. 1. Head showing pores and papillae pattern of the holotype of *Amblyeleotris neglecta*, BPBM 18291, 54 mm.

frenum present, fifth pelvic soft fin ray slightly shorter than fourth, branched once mid-ray, branches not separated (occur close together and run parallel to each other throughout the ray); longitudinal scale series 77–85; median predorsal scales 15–17, scales embedded anteriorly, squamation extending to above upper end of preopercular margin; gill opening reaching forward to below middle of opercle. Colour in alcohol beige, with five narrow dark brown bars, broadly bordered in lighter brown, the first from nape across operculum, the last on caudal peduncle; bars progressively less oblique, the last near-vertical; pale interspaces with irregular dark brown line, sometimes branching, often ending dorsally in dark spot; branchiostegal membranes dark brown; caudal fin with dark brown arc at base, limbs of arc narrowing posteriorly to midfin; remaining fins unmarked.

DESCRIPTION. Dorsal fin rays VI + I,12 (VI + I,13–14); anal fin rays I,13 (VI + I,14–15); pectoral fin rays 19 (18–19); pelvic fin rays I, 5 (I, 5), segmented caudal fin rays 17 (17), branched caudal fin rays 14 (14). Longitudinal scale series 83 (77–85); scales ctenoid, small, becoming smaller and cycloid anterior to posterior margin of first dorsal fin; scales on pectoral fin base cycloid; transverse scale count backwards 20 (19–20); transverse scale count forward 22 (21–22); predorsal (midline) scales 17 (15–16), embedded anteriorly, squamation extending anterior to a vertical with the preopercular margin; no scales on side of head. Body depth at anus 12.4% SL (10.0–10.4% SL); body width just posterior to gill opening 6.5% SL (5.0–5.6% SL); predorsal length 22.9% SL (21.2–21.7% SL); prepelvic length 28.0% SL (26.7–28.8% SL); preanal length 55.4% (50.9–53.5% SL); length of caudal peduncle 13.7% SL (13.2–14.7% SL); depth at caudal peduncle 8.0% SL (6.3–7.4% SL). Head length 25.9% SL (26.4–29.1% SL); head deeper than wide; head depth 42.9% SL (39.4–40.5% SL); head width 34.3% SL (28.3–34.5% SL); orbit diameter (measured to fleshy edge) moderate 29.3% HL (27.3–27.4% HL); bony interorbital space narrow, 4.3% HL (2.4–3.0% HL); gill opening moderately wide, extending forward to below middle of opercle; snout profile blunt, steep; posterior nasal opening small; anterior nasal opening in a short tube; reduced transverse papillae pattern on cheek (Fig. 1), supraorbital papillae well-developed.

Mouth large, oblique; lower jaw slightly projecting; upper jaw length 37.1% HL (32.3-37.1% HL); tongue truncate; teeth in upper jaw villiform, inward curving, in four rows, outermost row largest, two large recurved canines on either side of upper jaw, distance between canines about three-quarters of orbit diameter; teeth in lower jaw villiform, inward curving, in four to five rows, outermost row largest, one large recurved canine on either side of lower jaw, canines situated along second outermost row; margin of lips with papillae, papillae absent posteriorly on both upper and lower lips; teeth absent on vomer and palatine; snout short, snout length 9.3% HL (9.5–10.1% HL).

First dorsal fin triangular in males, somewhat triangular with rounded edges in females; third spine longest at 20.7% SL (17.0–19.7% SL); length of first dorsal fin base 16.5% SL (17.6–18.1% SL); length of second dorsal fin base 31.1% SL (30.5–32.1% SL); length of anal fin base 28.0% (28.0–28.5% SL); pectoral fin length 24.3% SL (24.1–25.2% SL); pectoral fin height 7.0% SL (5.0–5.3% SL); pelvic fin long, tips reaching anus; pelvic fin length 28.9% SL (23.5–25.2% SL); pelvic fins joined basally by a membrane for 6.6% of pelvic fin length (6.6–10.2% of pelvic fin length), pelvic frenum present, fifth pelvic fin ray shorter than fourth ray, branched once at mid-fin, branches not separated branches not separated (branches occur close together and run parallel to each other throughout the ray); caudal fin weakly lanceolate, moderately long, caudal fin length 36.3% SL (30.8–31.2% SL).

Colouration. In life, first dorsal fin hyaline with broad, light-brown bar on proximal two-thirds of fin, three to four rows of light-blue elliptical spots on light-brown region, spots situated on inter-ray membrane; second dorsal fin hyaline with narrow light-brown bar on proximal one-third of fin, two to three rows of light-blue spots on light-brown region, one to two light-blue spots on dorsal margin, spots situated on inter-ray membrane; anal fin hyaline, narrow light brown bar on proximal one-quarter of fin; colours do not persist in preservative. Two light-blue longitudinal lines along pelvic fin, lines lost in preservative. Dark arc on base of caudal fin, base of arc extending posteriorly into caudal fin, forming horizontal bar at ventral area of caudal fin, bar terminates midfin, radiating rows of light blue spots on inter-ray membrane, spots lost in preservative. In alcohol, base colour beige; narrow dark brown bars present, one on head, four on body; bars extending to ventral region of flank, first four anterior bars anteroventrally oblique, fifth bar vertical; first bar on nape across opercle to ventral area of branchiostegal membranes; second bar under first dorsal fin, third and fourth bars under second dorsal fin; last bar on caudal peduncle; pale interspaces with an irregular

Table 1. Counts and measurements of the types of *Amblyeleotris neglecta*.

	Holotype	Paratypes	
	BPBM 18291	BPBM 19893	SAIAB 80947
	54.0 mm SL	34.0 mm SL	31.8 mmSL
Counts			
Second dorsal-fin rays	I, 12	I, 14	I, 13
Anal-fin rays	I, 13	I, 15	I, 14
Left pectoral-fin rays	19	18	19
Right pectoral fin-rays	I, 5	I, 5	I, 5
Segmented caudal-fin rays	17	17	17
Branched caudal-fin rays	14	14	14
Longitudinal scale series	83	77	85
Transverse (backwards) scale count	20	19	20
Transverse (forward) scale count	22	22	21
Predorsal midline	17	11*	16
Morphometric measurements (in %HL)			
Head width	34.3	28.3	34.5
Head depth	42.9	39.4	40.5
Snout length	9.3	10.1	9.5
Interorbital distance	4.3	3.0	2.4
Orbit diameter	29.3	27.3	27.4
Upper jaw length	37.1	32.3	35.7
Morphometric measurements (in %SL)			
Head length	25.9	29.1	26.4
Predorsal length	22.9	21.2	21.7
Prepelvic length	28.0	28.8	26.7
Preanal length	55.4	53.5	50.9
Length of D1 base	16.5	17.6	18.9
Length of D2 base	31.1	32.1	30.5
Length of anal fin base	28.0	28.5	28.0
Length of caudal peduncle	13.7	14.7	13.2
Depth of caudal peduncle	8.0	7.4	6.3
Length of pelvic fin	28.9	23.5	25.2
Length of caudal fin	36.3	31.2	30.8
Body depth at anus	12.4	10.0	10.4
Body width posterior to gill opening	6.5	5.6	5.0
Length of pectoral fin	24.3	24.1	25.2
Height of pectoral fin	7.0	5.3	5.0
Length of first spine of first dorsal fin	18.7	16.8	12.3
Length of second spine of first dorsal fin	20.0	18.2	14.2
Length of third spine of first dorsal fin	20.7	19.7	17.0
Length of fourth spine of first dorsal fin	17.0	15.0	11.9
Length of spine of second dorsal fin	9.8	damaged	9.4
Length of first ray of second dorsal fin	11.5	damaged	10.7
Length of spine of anal fin	6.9	6.8	8.8
Length of first ray of anal fin	8.9	8.5	10.7
Length of pelvic fin spine	8.7	10.0	8.2
Measurements (in % pelvic fin length)			
Extent of unification of pelvic fin	6.6	6.6	10.2

* some scales missing

dark brown line, sometimes branching, often ending dorsally in dark spot. Anterior region of head light green in life, colour does not persist in preservative; dark spot above posterior end of maxilla; branchiostegal membrane dark brown; short post-orbital dark brown line coursing posteriorly, terminating posterior to preopercular margin; iridescent blue spots on nape, becoming light-brown in preservative, spot elliptical in holotype, diffuse in paratypes; small iridescent spots on operculum, becoming light-brown in preservative.

ETYMOLOGY. The specific name alludes to the fact that this species was first collected and photographed 34 years ago but only recently recognized as new.

REMARKS. The three type specimens of this species were collected in 1974 and 1975 at a depth of 15 m on a sand substratum with patches of the invasive seagrass *Halophila stipylacea* and occasional small coral heads. The underwater photograph in Plate I C was taken in the same general area in 1986, but at 33.5 m, where the substrate consisted of coarse sand and gravel. The desalination plant that was the landmark for the type locality of *Amblyeleotris neglecta* has been deactivated, but there has been concern over extensive pollution caused by the rearing of fish in cages off the North Beach of Eilat. Jacob Dafni, who is continuing a long-term a survey of the marine environment in the northern Gulf of Aqaba, reported that the goby's type locality is "not polluted, but not at its best."

This species was observed to live in symbiotic association with an alpheid shrimp, but the shrimp was neither collected nor photographed. Eight species of shrimps of the genus *Alpheus* are reported to live in association with nine species of gobies in the northern areas of the Red Sea (Karplus et al. 1981). The classification of the shrimps is in slow progress due to insufficient specimens. The shrimps in plates I and 2 were identified by Dr Arthur Anker. Shrimps in plates I F and II C are undescribed, and that in Plate II A is believed to be part of the *Alpheus "ochrostriatus"* species complex (Anker pers. comm.).

COMPARISONS TO CONGENERS IN THE RED SEA. *Amblyeleotris neglecta* differs from *A. sungami*, *A. triguttata* and *A. steinitzi* in the presence of predorsal midline scales (vs. absent). The extent of unification of the pelvic fin of *A. neglecta* is restricted to only the base (not more than 10.2%) while *A. sungami*, *A. triguttata* and *A. wheeleri* have the innermost rays of the pelvic fins attached to at least a quarter of the total pelvic fin length. *Amblyeleotris neglecta* differs from *A. diagonalis* primarily in the longitudinal scale counts (83–85 vs 59–75) and the presence of a pelvic frenum (vs. absent). The first of three narrow oblique bands on the head of *A. diagonalis* originates from the anterior orbital margin and terminates on the anterior margin of upper lip. This narrow dark brown band is diagnostic for this species and is absent in *A. neglecta*.

Comparative material examined. ***Amblyeleotris diagonalis***: [paratype] USNM 218981, 59 mm, Bond Island, Eastern Andaman, 8 March 1977; BPBM 19770, 5: 37–46 mm, Sudan, Suakin Harbor, silty sand and small rubble, at 10–14 m, 15 October 1975; BPBM 28420, 43 mm, Saudi Arabia, off north end of Jeddah, sloping silty sand bottom, at 46 m, 17 May 1982; BPBM 30375, 2: 56–64 mm, Saudi Arabia, Yanbu, sand adjacent to patch reef, at 12 m, 29 May 1984; USNM 263588, 2: 22–23 mm, Saudi Arabia, reef on north side of Jeddah harbor, 10 April 1977. ***Amblyeleotris steinitzi***: BPBM 13431, 3: 33–43 mm, Gulf of Aqaba, Sinai Peninsula, El Hamira, sandy reef, at 1.5–3 m, 9 June 1972; BPBM 18139, 41 mm, Gulf of Aqaba, 8–12 September 1974; BPBM 20357, 3: 32–38 mm, Sudan, Towarit Reef Complex, at 10 m, 10 October 1974; BPBM 37812, 2: 39–50 mm, August 1976; USNM 264394, 30 mm, Israel, Gulf of Aqaba, Bay at El Hameira, 8 September 1969; USNM 264407, 3: 34–36 mm, Israel, Gulf of Aqaba, Bay at El Hameira, 16 July 1969. ***Amblyeleotris sungami***: [paratype] SMF 9620, 51 mm, Sudan coast, Suakin Harbor; BPBM 17879, 4: 39–65 mm, Gulf of Aqaba, Eilat, 25-30 m, 9–10 September 1974; BPBM 19287, 10: 28–84 mm, Gulf of Aqaba, Eilat, at 15 m, 28 September 1974; BPBM 20372, 3: 55–70 mm, Sudan, Suakin Harbor, at 1.5–2.5 m, 11 October 1974; USNM 263361, 3: 27–52 mm, Israel, Gulf of Aqaba, Bay at El Himeira, 9 September 1969; USNM 263371, 11: 16–47 mm, Israel, Gulf of Aqaba, Bay at El Himeira, 8 September 1969. ***Amblyeleotris triguttata***: [holotype] BPBM 30374, 65 mm, Saudi Arabia, Yanbu, sand adjacent to reef patch, at 12 m, 29 May 1984; [paratypes] BPBM 28372, 3: 50–67 mm, Saudi Arabia, Sharm Abhur, north of Jeddah, 10 May 1982; [paratype] BPBM 35717, 69 mm, Yemen, Hanish Islands, sand and rubble, at 17 m, 18 May 1993. ***Amblyeleotris wheeleri***: BPBM 27469, 37 mm, Sudan, entrance to Port Sudan Harbor, rubble and sand patch in fringing reef, at 5 m, 14 January 1980; BPBM 36030, 2: 50.0–57.0 mm, Oman.

KEY TO THE RED SEA SPECIES OF *AMBLYELEOTRIS*

1a. Pelvic fins united by membrane for at least one-fourth of its length 2
1b. Pelvic fins separate or united by membrane only at extreme base 4

2a. Pelvic fins with a frenum; predorsal midline scales absent; anal rays 13–15; longitudinal scale series 96–106; orange to brownish red bars on body narrower than white interspace 3

2b. Pelvic fins without a frenum; predorsal midline scales present; anal rays 12; longitudinal scale series 59–68; red to brown bars on body equal to or broader than white interspaces ..... *wheeleri*

3a. Anal soft rays 14 or 15; caudal fin length 2.75–3.25 in SL; a black spot on nape above opercle; two black spots on first dorsal fin; a curving dark brown line from below eye to posterior margin of maxilla; irregular brown markings in white spaces between brownish-red bars on body ..... *triguttata*

3b. Anal soft rays 13; caudal fin length 2.25–2.7 in SL; marking not as above; numerous small pale-blue spots and occasional small orange-yellow spots on white spaces between orange-red bars on body ..... *sungami*

4a. Predorsal midline scales absent; prepelvic region naked; anal soft rays 12; white spaces between brownish-red bars on body devoid of markings ..... *steinitzi*

4b. Predorsal midline scales present; prepelvic region with scales (may be embedded); anal soft rays 12–14; dark markings on white spaces between reddish bars on body present 5

5a. Scales in longitudinal series 59–75; pelvic frenum absent; three narrow, oblique, orange-red to dark brown bands on head; first band originates from orbital anterior margin, terminates on the anterior margin of upper lip; second band originates on nape across head, terminating at the posterior margin of upper and lower maxilla; third bar broader than the second, originates on nape across head terminating at ventral region of operculum; a broad white horizontal bar at one-third proximal base, of anal fin, bordered distally with a blue-edged orange band ..... *diagonalis*

5b. Scales in longitudinal series 83–85; pelvic frenum present; markings not as above; anal fin hyaline, white horizontal band at proximal one-quarter of anal fin base ..... *neglecta* nov. sp

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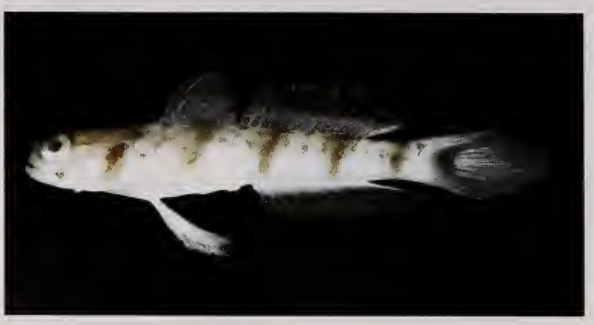
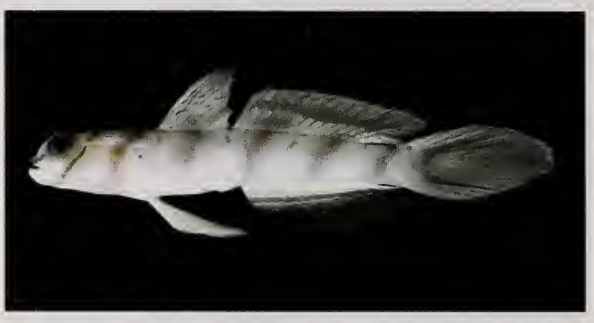
PLATE 1

A. Holotype of *Amblyeleotris neglecta*, BPBM 18291, 54.0 mm SL, Eilat, Gulf of Aqaba.



B. Paratype of *Amblyeleotris neglecta*, SAIAB 80947, 31.8 mm SL, Eilat, Gulf of Aqaba.

C. Underwater photo of *Amblyeleotris neglecta*, about 60 mm SL, Eilat, Gulf of Aqaba.

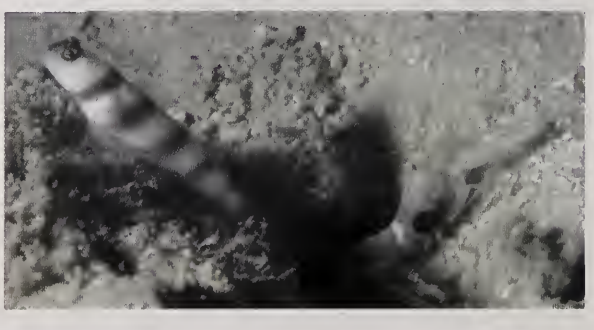


D. *Amblyeleotris diagonalis*, BPBM 19770, 43 mm, Suakin, Sudan.

E. *Amblyeleotris diagonalis*, BPBM 28420, 44 mm, Jeddah, Saudi Arabia.

F. Underwater photo of *Amblyeleotris diagonalis* with *Alpheus* cf. *bedllulus*, Jeddah, Saudi Arabia.

G. *Amblyeleotris steinitzi*, BPBM 13431, 35 mm, El Hamira, Gulf of Aqaba.



H. Underwater photo of *Amblyeleotris steinitzi* with *Alpheus djeddensis*, Eilat, Gulf of Aqaba.

PLATE 2

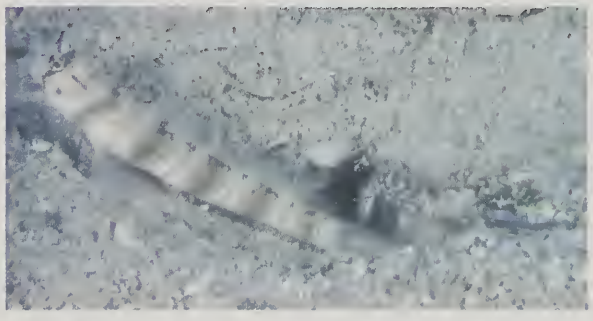
A. Underwater photo of *Amblyeleotris steinitzi* with *Alpheus "ochrostriatus"*, Eilat, Gulf of Aqaba.

B. *Amblyeleotris sungami*, BPBM 17879, 55 mm, Eilat, Gulf of Aqaba.

C. Underwater photo of *Amblyeleotris sungami* with *Alpheus* sp., Eilat, Gulf of Aqaba.

D. Underwater photo of Amblyeleotris sungami with Alpheus bellulus (in burrow entrance), Eilat, Gulf of Aqaba.

E. Holotype of *Amblyeleotris triguttata*, BPBM 30374, 65 mm, Yanbu, Saudi Arabia.



F. Underwater photograph of *Amblyeleotris triguttata* with *Alpheus bellulus*, Yanbu, Saudi Arabia.

G. *Amblyeleotris wheeleri*, BPBM 27469, 37 mm, Port Sudan, Sudan.

H. Underwater photo of *Amblyeleotris wheeleri*, Port Sudan.

Parupeneus fraserorum, a new species of goatfish (Perciformes: Mullidae) from South Africa and Madagascar

John E. Randall[1] and Dennis R. King[2]

[1]Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA
[2]4319, 56 Westridge, Umhlanga 4319, KwaZulu-Natal, South Africa

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Abstract. *Parupeneus fraserorum* is described as a new species of mullid fish from three specimens collected off the coast of KwaZulu-Natal, South Africa in 39–57 m. Five additional specimens taken by trawl in 81 m off southeastern Madagascar are listed as non-type material. This species is most similar to *P. chrysopleuron*, known from Japan to Western Australia, which differs in having an asymmetrical maxilla, a higher and more pointed first dorsal fin, and larger size (223 mm SL, compared to 166.5 mm)

Keywords: Mullidae, *Parupeneus*, new species, South Africa, Madagascar

INTRODUCTION

The goatfish family Mullidae consists of six genera: *Mulloidichthys* Whitley, *Mullus* Linnaeus, *Parupeneus* Bleeker, *Pseudupeneus* Bleeker, *Upeneus* Cuvier, and *Upeneichthys* Bleeker. *Mulloidichthys* is the only genus represented by species in all tropical and subtropical seas. The species of *Upeneus* are found in all except the eastern Pacific. *Mullus* is confined to the Atlantic, and *Pseudupeneus* to the Atlantic and eastern Pacific. *Upeneichthys* is represented by three species in southern Australia and New Zealand. The species of *Parupeneus* are known only from the Indo-Pacific region. The genus is differentiated primarily by dentition. The teeth in the jaws are bluntly conical and well spaced in a single row, and there are no teeth on the vomer or palatines. All the species of *Parupeneus* share the following meristic data: dorsal fins VIII + 9; anal-fin rays 7; principal caudal-fin rays 15; pelvic-fin rays I,5; and lateral-line scales 27 or 28. The variation in the lateral-line scale count is attributed to the decision of the observer where to end the scale count at the base of the caudal fin (two or three pored scales are on the caudal-fin base).

Randall (2004) revised *Parupeneus*, recognizing 27 species. What appeared to a 28th species of the genus was known at that time from an underwater photograph taken in about 30 m off the coast of KwaZulu-Natal, South Africa, but no specimens were collected until 2008. We describe this species here from three specimens collected in 39–57 m off KwaZulu-Natal. We also record five non-type specimens taken by trawl off southeastern Madagascar in the depth range of 39–81 m.

MATERIALS AND METHODS

Specimens of the new species are deposited in the Bernice P. Bishop Museum, Honolulu (BPBM) and the South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB).

Lengths of specimens are given as standard length (SL), measured from the front of the upper lip to the base of the caudal fin (posterior end of the hypural plate); head length (HL) is measured from the same anterior point to the posterior end of the opercular flap; body depth is taken vertically from the base of first dorsal spine where it emerges from the body (not the internal base); body width is the maximum width just posterior to the gill opening; orbit diameter is the greatest fleshy diameter, and interorbital width the least fleshy width; cheek depth is measured from the lower fleshy edge of the orbit vertically to the ventral margin of the preopercle; upper-jaw length is taken from the front of the upper lip to the posterior end of the maxilla; depth of maxilla is the maximum fleshy vertical depth; barbel length is the maximum straight length of the longest barbel; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of fin spines and rays of the dorsal and anal fins are measured from where they emerge from the body; caudal-fin length is the horizontal distance from the base of the fin to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the longest and shortest rays; pectoral-fin length is the length of the longest ray; pelvic-fin length is measured from the base of the pelvic spine to the tip of the longest

soft ray. Lateral-line scale counts do not include the 2 or 3 pored scales on the caudal-fin base; pectoral-ray counts include the upper rudimentary ray; gill-raker counts were made on the first gill arch of the right side. They include all rudiments; the raker at the angle is contained in the count of the lower-limb gill rakers.

In the description of the new species, data in parentheses refer to paratypes. The data in the table of measurements of the new species are given as percentages of the standard length. Proportional measurements in the text of the diagnosis and description are rounded to the nearest 0.05. Counts of pectoral-fin rays were made on both sides.

Parupeneus fraserorum sp. nov.

Fig. 1 – 6, Table 1

Fig. 1. Holotype of *Parupeneus fraserorum*, SAIAB 81385, 166.5 mm SL, KwaZulu-Natal. (Photo by Dennis R. King).

Holotype. SAIAB 81385, 154.5 mm, South Africa, KwaZulu-Natal, reef off Pumula (near Hibberdene), 30°40.03'S, 30°35.40'E, reef, 57 m, hook and line, M.D. Fraser, 2 September 2008.

Paratypes. BPBM 40931, 166.5 mm, and SAIAB 81386, 151 mm, South Africa, KwaZulu-Natal, reef off Pumula (near Hibberdene), 30°38.110'S, 30°33.630'E, 39 m, spear, M.D. Fraser, 31 August 2008.

Non-types. SAIAB 82829, 92–118 mm, Madagascar, 25°8.95'S, 47°6.92'E, 81 m, trawl, R/V *Dr. Fridtjof Nansen* Station 12, 7 September 2008.

Diagnosis. Pectoral-fin rays 16 or 17; gill rakers 6 + 21 or 22; body depth 2.8–2.9 in SL; head length 2.8–2.9 in SL; snout length 1.8–1.85 in HL; posterior margin of maxilla symmetrically convex; barbels 1.3–1.35 in HL; third dorsal spine longest, 1.8–2.0 in HL; longest dorsal ray 3.15–3.3 in HL; penultimate dorsal-fin ray only slightly shorter than last ray; pectoral-fin length 1.2–1.25 in HL; pelvic-fin length 1.35–1.5 in HL. Colour in life: an orange-yellow stripe following lateral line; body above stripe pale brown; body below stripe white with light blue iridescence centrally in each scale, posteriorly becoming a smaller, more defined spot; edges of scales narrowly dark; a dark brown spot about half pupil diameter in height at upper end of gill opening; faint oblique blue lines anterior and posterior to eye; wavy blue lines in second dorsal and anal fins; iridescent blue longitudinal streaks in caudal fin; a light red bar at base of pectoral fins; barbels white.

Description. Dorsal fins VIII + 9; anal fin I, 7; pectoral-fin rays 16 (16 or 17), the upper two and lowermost unbranched; pelvic fin I, 5; principal caudal-fin rays 15, the middle 13 branched; upper and lower procurrent caudal-fin rays 9, the posterior two segmented; lateral-line scales 27 (plus 3 on caudal-fin base); scales above lateral line to origin of first dorsal fin 2; scales below lateral line to origin of anal fin 5; circumpeduncular scales 14; median predorsal scales 13; median prepelvic scales 7; gill rakers 6 + 22 (6 + 21); branchiostegal rays 3; vertebrae 10 + 14.

Body depth 2.85 (2.8–2.9) in SL; body width 1.95 (1.9–2.05) in body depth; head length 2.9 (2.8–2.85) in SL; snout length 1.8 (1.8–1.85) in HL; orbit diameter 4.55 (4.35–4.45) in HL; interorbital space convex, the width 3.25 (3.45–3.5) in HL; cheek depth 2.15 (2.2–2.25) in HL; barbels reaching beyond posterior margin of preopercle, their length 1.35 (1.3–1.35) in HL (barbels of holotype had dried before preservation, so their length should be greater than given in Table 1); caudal-peduncle depth 3.0 (2.9–3.1) in HL; caudal-peduncle length 1.6 (1.65–1.77) in HL.

Mouth ventral, and slightly oblique, the gape forming an angle of about 15° to horizontal axis of head and body; mouth small, the upper-jaw length 2.55 (2.65–2.7) in HL; posterior edge of maxilla symmetrically convex; maximum depth of maxilla 5.1 (5.25–5.55) in HL; jaws of holotype with 12 or 13 bluntly conical, unevenly spaced teeth on each side, the anterior teeth slightly incurved (median anterior teeth of upper jaw aberrantly short and rounded); posterior two teeth in upper jaw slightly forward-curving; no teeth on vomer or palatines; tongue fused to floor of mouth.

Posterior nostril a short vertical slit at front edge of orbit before middle of eye; anterior nostril a small aperture with a low posterior rim on line from posterior nostril to front of upper lip, slightly closer to front of upper lip than posterior nostril. Longest gill raker about 1.2 in length of longest gill filament.

Opercle with a single spine at level of lower edge of orbit, its tip ending at edge of opercular membrane; free edge of preopercle extending dorsally to level of lower edge of orbit, the ventral margin ending a pupil diameter short of maxilla.

Scales finely ctenoid; scales dorsally on head extending forward an orbit diameter from front of upper lip; three oblique rows of scales on cheek to edge of preopercle; two near-vertical rows of scales on opercle, and one on subopercle and interopercle; two scales on expanded posterior part of maxilla, the anterior scale about one-third size of posterior and overlapping base

Table 1. Proportional measurements of type specimens of *Parupeneus fraserorum* as percentages of SL.

	Holotype	Paratyes	
	SAIAB 81385	SAIAB 81386	BPBM 40931
Standard length (mm)	154.5	151.0	166.5
Sex	male	female	female
Body depth	34.9	35.5	34.6
Body width	17.8	17.4	18.0
Head length	34.2	35.1	35.8
Snout length	19.2	19.3	19.4
Orbit diameter	7.5	8.1	7.8
Interorbital width	10.1	9.6	10.2
Cheek depth	15.9	15.7	16.1
Upper-jaw length	13.4	13.1	13.5
Depth of maxilla	6.7	6.3	6.8
Barbel length	25.8	27.5	26.9
Caudal-peduncle depth	11.4	12.0	11.6
Caudal-peduncle length	21.5	21.1	20.9
Pre-dorsal length	42.3	damaged	43.8
Pre-anal length	63.0	65.4	64.0
Pre-pelvic length	32.8	31.7	32.9
First dorsal-fin spine	4.4	4.3	3.6
Second dorsal-fin spine	16.9	17.1	16.3
Third dorsal-fin spine	19.2	18.5	17.8
Fourth dorsal-fin spine	18.7	18.3	17.4
First dorsal-fin ray	10.1	10.0	broken
Second dorsal-fin ray	10.9	10.7	10.8
Eighth dorsal-fin ray	10.4	10.5	10.3
Ninth dorsal-fin ray	10.0	10.8	10.8
Anal-fin spine	2.8	1.9	2.3
Seventh anal-fin ray	12.6	13.6	11.4
Caudal-fin length	25.4	25.5	broken
Caudal concavity	14.2	14.0	–
Pectoral-fin length	28.3	29.2	28.8
Pelvic-fin spine length	16.5	16.9	aberrant
Pelvic fin length	24.8	25.6	24.0

of posterior scale; fins naked except for base of caudal fin with three rows of scales like those of body, followed by series of small, slender scales between rays about halfway along fin; slender pelvic axillary scale about 40% length of pelvic spine; a midventral scaly process of two rounded scales at base of pelvic fins, the first broadly overlapping the second; sensory canals on lateral-line scales with three to seven branches.

Origin of dorsal fin above base of third lateral-line scale, the predorsal length 2.35 (2.3) in SL; first dorsal spine very short, 7.8 (8.2–9.9) in HL; second dorsal spine 2.0 (2.05–2.2) in HL; third dorsal spine 1.8 (1.9–2.0) in HL; fourth dorsal spine 1.85 (1.9–2.05) in HL; first dorsal soft ray 3.4 (3.4–4.25) in HL; second dorsal soft ray 3.15 (3.25–3.3) in HL; eighth dorsal soft ray slightly shorter than ninth ray; ninth dorsal soft ray 3.15 (3.25–3.3) in HL; origin of anal fin below base of second dorsal soft ray, the preanal length 1.6 (1.55) in SL; anal spine very small, 12.2 (15.5–18.5) in HL; seventh anal soft ray longest, 2.7 (2.6–3.1) in HL; caudal-fin length 1.35 (1.4) in HL; caudal fin strongly forked, the caudal concavity 2.4 (2.5) in HL; pectoral fins long, 1.2 (1.2–1.25) in HL; pelvic fins long, but not reaching anus, 1.2 (1.2–1.25) in HL; pelvic spine 1.4 (1.35–1.5) in HL.

Colour of holotype in alcohol: body pale tan above lateral line, near-white ventrally (specimen in preservative only two months; will be more brown with age); a vertically oval blackish spot on membrane above opercular spine, its height equal to pupil diameter; fin membranes translucent, the rays pale yellowish; barbels whitish. Colour of holotype when fresh as in Plate 1A.

Colour in life from underwater photographs: an orange-yellow stripe on body following lateral line, its width less than scale height; body above stripe pale brown, with narrow darker brown scale edges, the darker scale edges extending into stripe; body below stripe white with light blue iridescence centrally in each scale, becoming a smaller, more defined spot on each scale posteriorly and on caudal-fin base; an oval dark brown to deep red spot a pupil diameter in height on membrane above opercular spine; three oblique blue lines extending anterior to eye and less distinctly posterior to eye; fins translucent pale orangish to reddish grey, the second dorsal with five narrow, wavy, pale blue stripes, the lower two posterior in fin; caudal fin with blue lines paralleling rays, some broken into dashes, the uppermost iridescent; anal fin with four narrow pale blue stripes; a light red bar at base of pectoral fins; barbels white.

The underwater photograph of Plate 1D was taken of a fish actively feeding during the day. Goatfishes of this genus have been observed to quickly assume a disruptive red colour pattern while feeding. We believe this is also the nocturnal colour pattern.

ETYMOLOGY. We are pleased to name this species collectively for Michael D. Fraser and Valda J. Fraser, he for collecting the type specimens, and she for her underwater photograph of Plate 1D, our first awareness of the species.

REMARKS. *Parupeneus fraserorum* appears to be most closely related to *P. chrysopleuron* Temminck & Schlegel, type locality Japan, known otherwise only from Taiwan, Arafura Sea, and the Northwest Shelf of Australia. Both have the same general morphology, the broad orange-yellow stripe along the lateral line, and the oblique

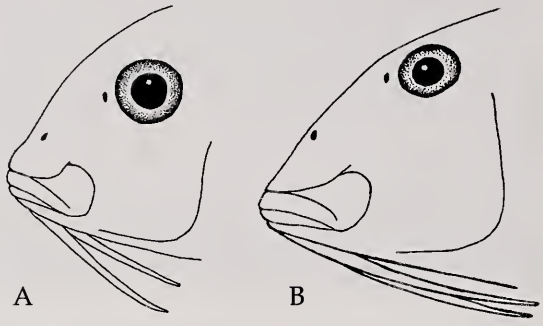

Fig. 2. Shape of maxillae of *Parupeneus fraserorum* (A) and *P. chrysopleuron* (B). (Drawn by E. Heemstra).

pale blue lines anterior and posterior to the eye. They differ in colour principally by the dark spot above the opercular spine and the blue streaks of the caudal fin of *P. fraserorum*. The only slight meristic difference is the count of 16 or 17 pectoral rays for *P. fraserorum* vs. 15 or 16 for *P. chrysopleuron*. The most significant morphological differences are the symmetrically rounded maxilla of *P. fraserorum* [sharing this character with *P. heptacanthus* (Lacepède) and *P. jansenii* (Bleeker) – Fig. 2] and the higher and more pointed first dorsal fin of *P. chrysopleuron* (longest dorsal spine 1.5–1.75 in HL, compared to 1.8–2.25 in HL for *P. fraserorum*). In addition, *P. chrysopleuron* appears to attain larger size. The three type specimens are fully mature, the largest 166.5 mm SL. The second author has not seen any individuals larger than 180 mm SL. Three of eleven specimens of *P. chrysopleuron* examined by the first author are over 200 mm SL, the largest 223 mm.

At the present time, *Parupeneus fraserorum* is known only from KwaZulu-Natal, South Africa and southeastern Madagascar from depths of 27–81 m. It was first observed off the KwaZulu-Natal coast between Scottburgh (30°17'S) and Pumula (30°38'S). In January, 2009, the second author photographed it on a barge intentionally sunk six weeks earlier as an artificial reef in 27 m at 28°9.771'S, 32° 34.042'E (2 km south of Cape Vidal).

Specimens from Madagascar were collected from six trawling stations from the R/V *Dr. Fridtjof Nansen* in September and October, 2008 in 40–81 m. Five specimens from Station 12, the deepest collection, were deposited at the South African Institute for Aquatic Biodiversity (listed above as nontypes).

The two paratypes from KwaZulu-Natal were collected from a group of four or five individuals in an area about 25 x 25 m. The species is generally found over sand bottom near the edge of low-profile reefs, usually singly, but occasionally in loose pairs.

ACKNOWLEDGEMENTS

We thank Michael Fraser for collecting the KwaZulu-Natal specimens of *Parupeneus fraserorum*, Valda Fraser for her underwater photograph, and Jessica Escobar-Porras and the scientific crew of the R/V *Dr. Fridtjof Nansen* Station for the specimens and photographs from Madagascar. Simon A. Chater of the South African Association for Marine Biological Research assisted in the preservation of specimens, and Loreen R. O'Hara of the Bishop Museum took x-rays. Special thanks are due Elaine Heemstra of the South African Institute for Aquatic Biodiversity for calling our attention to the specimens of *P. fraserorum* from Madagascar and arranging for the loan of specimens and photographs. Mark McGrouther of the Australian Museum provided a photograph of the head of *P. chrysopleuron* so that Elaine Heemstra could draw Fig. 1. The manuscript was reviewed by Philip C. Heemstra and Helen A. Randall.

LITERATURE CITED

RANDALL, J. E. 2004. Revision of the goatish genus *Parupeneus* (Perciformes: Mullidae), with descriptions of two new species. *Indo-Pacific Fishes* **36**: 1–64.

Fig. 3. *Parupeneus fraserorum*, KwaZulu-Natal. (Photo by Dennis R. King).

Fig. 4. *Parupeneus fraserorum*, KwaZulu-Natal. (Photo by Dennis R. King).

Fig. 5. *Parupeneus fraserorum* actively feeding, KwaZulu-Natal. (Photo by Valda J. Fraser).

Fig. 6. *Parupeneus fraserorum*, SAIAB 82829, 117 mm SL, Madagascar. (Photo by Jessica Escobar-Porras).

Three new goatfishes of the genus *Parupeneus* from the Western Indian Ocean, with resurrection of *P. seychellensis*

John E. Randall[1] and Elaine Heemstra[2]

[1]Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA
e-mail: jackr@hawaii.rr.com
[2]South African Institute for Aquatic Biodiversity, Private Bag l015,
Grahamstown 6140, South Africa. e-mail: e.heemstra@saiab.ac.za

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Abstract. Three new mullid fishes of the genus *Parupeneus*, previously misidentified as *P. heptacanthus* (Lacepède), are described from the western Indian Ocean. All share with *P. heptacanthus* a symmetrical posterior margin of the maxilla (compared to species with an asymmetrical maxilla from a dorsoposterior extension) and low gill-raker counts. All differ by having a more elongate body, flatter interorbital space, and in lacking a dark reddish spot on the body above the pectoral fin. *Parupeneus angulatus*, described from two specimens trawled from 57 m on the Seychelles Bank, has a slightly angular instead of rounded posterior margin to the maxilla and 20 lower-limb gill rakers. *Parupeneus minys*, named from six specimens from the Seychelles, Mozambique and India, all sexually mature at only 70–106 mm SL, is pink in life with an indistinct yellow stripe along the lateral line. *Parupeneus nansen* is represented by four type specimens taken by trawl from 43–51 m off southern Mozambique and seven nontype specimens from off the northeastern coast of Somalia in 25–29 m. It is unique in having three red spots in life on the caudal fin, one in each lobe and one at base. *Parupeneus seychellensis* (Smith & Smith) is a valid species distinct from *P. heptacanthus*. Although similar in body shape and in having a convex interorbital, it differs in having shorter pelvic fins, 18–21 lower gill rakers (vs. 21–23 for *P. heptacanthus*) and in colour, notably lacking the dark reddish spot on the upper side and in having a striped colour pattern from a red spot on each scale of the dorsal three longitudinal scale rows. A key is provided for the 19 species of *Parupeneus* of the western Indian Ocean.

Keywords: Mullidae, *Parupeneus*, new species, key to Western Indian Ocean species

INTRODUCTION

The goatfishes of the perciform family Mullidae are easily recognised by the pair of chemosensory barbels at the front of their chin with which they probe for a wide variety of benthic prey, such as crustaceans, polychaetes and small bivalves. The Indo-Pacific genus *Parupeneus* Bleeker, the second largest of the family, is distinct in having a single row of bluntly conical teeth in the jaws and lacking teeth on the vomer and palatines. Randall (2004) revised the genus and reduced the 69 nominal species to 27 valid species. Many of the species lack markings that persist in museum specimens. Without knowledge of life colour, some specimens can be difficult to identify to species. All of the species of *Parupeneus* have the same number of rays of the median fins and the same number of lateral-line scales. The counts of pectoral-fin rays are modally 15 or 16, except one species with 17. The gill-raker counts proved to be helpful to differentiate the species, but these counts are broadly overlapping for all species (Randall, 2004: Table 2). The most useful proportional measurements are body depth, head length, snout length, cheek depth, barbel length and the length of the paired fins.

Two of the species, the wide-ranging *Parupeneus heptacanthus* (Lacepède) and *P. jansenii* (Bleeker) from Indonesia and the Philippines, were separated in the key to the species of the genus by having the posterior end of the maxilla symmetrically rounded (Fig. 3 A); the remaining 25 species have a broad dorsoposterior extension on the maxilla (Fig. 3 B).

An undescribed species of *Parupeneus*, recognised more than five years ago from an underwater photograph taken off the coast of KwaZulu-Natal, was recently collected and described as *P. fraserorum* Randall and King (2009). It also has a rounded maxilla.

Two Bishop Museum specimens taken by trawl in 57 m from the Seychelles Bank, previously identified as *Parupeneus heptacanthus*, represent an undescribed species. The posterior end of the maxilla is symmetrical but not perfectly rounded. Instead, there is a slight angularity (Fig. 3 C) that led to closer examination. The body of these two fish is more elongate than *P. heptacanthus* of the same size, and the gill-raker count

of 6 + 20 confirmed the separation from *P. heptacanthus*, which has 6 or 7 + 21–23 gill rakers.

Six small specimens, 70–106 mm SL, of a second new species of *Parupeneus* from the Seychelles, India and Mozambique were previously considered as juveniles of *P. heptacanthus* until all were found to be sexually mature. They are now differentiated by a more slender body, shorter snout, and especially the shorter barbels, compared to *P. heptacanthus* of small size. They also lack the small dark spot on and below the eighth lateral-line scale that is typical of *P. heptacanthus*. This spot is often faded on old museum specimens of *P. heptacanthus*.

A recent expedition in the western Indian Ocean, with scientific staff taking colour photographs of freshly caught specimens, has revealed a third new species with a symmetrical maxilla. It is described here from four specimens taken by trawling off the coast of southern Mozambique in 43–51 m. Seven additional specimens of this species were found in the Bishop Museum fish collection misidentified as *P. heptacanthus* (Lacepède); they were taken by trawl in 25–29 m off the northeastern coast of Somalia. Because information is lacking on the life colour of these specimens, they are not designated as paratypes.

In their book *The Fishes of the Seychelles*, Smith & Smith (1963: 22, pl. 88 B) named a new species of *Parupeneus* as *Pseudupeneus seychellensis* from one specimen from a market in Mahé, Seychelles. Their description consisted of the following, "Many at Seych, differs from all known species in markings and 6 +18 gillrakers. Type, male, 10 in.". Their Figure B on Plate 88 is a colour painting of the holotype. Ben-Tuvia in Smith & Heemstra (1986: 611) placed *Parupeneus seychellensis* in the synonymy of *P. cinnabarinus* Cuvier in Cuvier & Valenciennes (1829). Randall (2004: 30) followed Ben-Tuvia, but treated *P. cinnabarinus* as a junior synonym of *P. heptacanthus* (Lacèpede). Figure 2 is a colour photograph of a specimen of *P. heptacanthus* from the Red Sea. We report here that *P. seychellensis* is a valid species from examination of the holotype, a second SAIAB specimen from Mahé obtained with rotenone in 2005 of which a colour photograph was taken, and one lot of 17 rotenone specimens from Mahé sent on loan by the Academy of Natural Sciences of Philadelphia.

Parupeneus heptacanthus remains a common species throughout the Indian Ocean, including the Red Sea, Persian Gulf, and Andaman Sea, east in the Pacific to the Caroline Islands and Fiji, with 46 lots examined in the Indian Ocean (Randall, 2004: 31, fig. 6) -- see Figs. 1 and 2.

Valuable information on life colour and depth range of species of *Parupeneus* was provided by the publication of Taquet & Diringer (2007) on fishes of the Indian Ocean. Their figure of *Parupeneus procerigena* (as *P. chrysopleuron*) is the first record of life colour of this species.

We present a key to the 19 species of *Parupeneus* from the western Indian Ocean.

MATERIALS AND METHODS

Specimens for this study of species of *Parupeneus* are from the fish collections of the Academy of Natural Sciences of Philadelphia (ANSP); Bernice P. Bishop Museum, Honolulu (BPBM); Hebrew University of Jerusalem (HUJ); Muséum National d'Histoire Naturelle, Paris (MNHN); South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB); and the National Museum of Natural History, Washington, D.C. (USNM).

Lengths of specimens are given as standard length (SL), measured from the front of the upper lip to the base of the caudal fin (posterior end of the hypural plate); head length (HL) is measured from the same anterior point to the posterior end of the opercular flap; body depth is taken vertically from the base of first dorsal spine where it emerges from the body (not the internal base); body width is the maximum width just posterior to the gill opening; orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width; cheek depth is measured from the lower fleshy edge of the orbit vertically to the ventral edge of the preopercle; upper-jaw length is taken from the front of the upper lip to the posterior end of the maxilla; depth of the maxilla is the maximum vertical fleshy depth; barbel

Fig. 1. *Parupeneus heptacanthus*, BPBM 29732, 130 mm SL, Lombok, Indonesia (Photo by J. E. Randall).

Fig. 2. *Parupeneus heptacanthus*, HUJ 8330, 225 mm SL, Gulf of Aqaba, Red Sea (Photo by J. E. Randall).

length is the maximum straight length of the longest barbel; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of fin spines and rays of the dorsal and anal fins are measured from where they emerge from the body; caudal-fin length is the horizontal distance from the base of the fin to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the longest and shortest rays; pectoral-fin length is the length of the longest ray; pelvic-fin length is measured from the origin of the pelvic spine to the tip of the longest soft ray. Lateral-line scale counts do not include two or three pored scales on the caudal-fin base; pectoral-ray counts include the upper rudimentary ray; gill-raker counts were made on the first gill arch of the right side. They include all rudiments; the raker at the angle is contained in the count of the lower-limb gill rakers.

In the description of the new species, data in parentheses refer to paratypes. Proportional measurements in the text of the diagnosis and description are rounded to the nearest 0.05. Counts of pectoral rays were made on both sides, and gill-raker counts only on the right side.

Table 1. Lower-limb gill-raker counts of *Parupeneus heptacanthus* and similar Indian Ocean species.

Species	Number of gill rakers					
	18	19	20	21	22	23
P. angulatus			2			
P. heptacanthus				7	10	4
P. minys				3	3	
P. nansen				6	4	1
P. seychellensis	2	5	9	5		

KEY TO THE SPECIES OF *PARUPENEUS* OF THE WESTERN INDIAN OCEAN

1a. A black spot as large or larger than eye centred on lateral line below rear base of first dorsal fin, with a large white spot behind and adjacent (Indo-Pacific except Red Sea and Persian Gulf, 1-75 m) ..... *pleurostigma*
1b. Colour not as in 1a; a black spot as large or larger than eye, if present, on caudal peduncle 2

2a. Two narrow black bars, one below each dorsal fin, nearly reaching ventral margin of body (a faint third dark bar sometimes present dorsally on caudal peduncle) (Oman and east coast of Africa to Andaman Sea and southwestern Indonesia, 1–80 m) ..... *trifasciatus*
2b. Colour not as in 2a 3

3a. Posterior end of maxilla symmetrical (Fig. 3 A, C) 4
3b. Posterior end of maxilla not symmetrical, either with a broad dorsoposterior lobe, or slanting forward ventrally (Fig. 3 B) 10

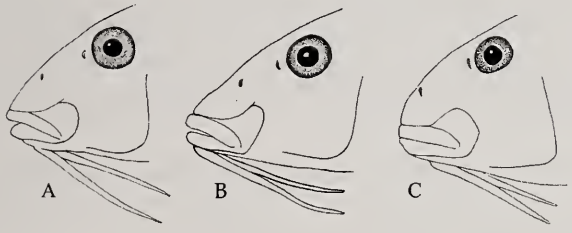

Fig. 3. Shape of maxilla of species of *Parupeneus*. **A**. *P. heptacanthus*, 130 mm SL. **B**. *P. macronemus*, 115 mm SL. **C**. *P. angulatus*, 141.5 mm SL (Drawn by E. Heemstra).

4a. Cheek depth 1.9–2.1 in HL; dorsal profile of snout steep, forming an angle of about 60° to horizontal axis of body; two pale yellow stripes in life, one above and one below lateral line (Seychelles and Saya de Malha Bank, 20–220 m) ..... *procerigena*
4b. Cheek depth 2.2–3.5 in HL; dorsal profile of snout forming an angle of 35–50° to horizontal axis of body; a yellow stripe, if present, on lateral line 5

5a. Pectoral fins long, 1.2–1.25 in HL; a dark brown spot about half pupil size at upper end of gill opening (KwaZulu-Natal and southern Madagascar, 28–81 m) ..... *fraserorum*
5b. Pectoral fins not long, 1.25–1.55 in HL; no dark brown spot at upper end of gill opening 6

6a. Barbels long, 1.0–1.3 in HL; lower-limb gill rakers 21–23; a small dark red to brown spot usually present on and below seventh and eighth lateral-line scales; interorbital space convex (Red Sea and east coast of Africa to Caroline Islands and Fiji, 12–88 m) ..... *heptacanthus*

6b. Barbels not as long, 1.2–1.45 in HL; lower-limb gill rakers 18–22; no dark red or brown spot on and below seventh and eighth lateral-line scales; interorbital space convex or medially flat 7

7a. Interorbital space convex; body depth 3.1–3.5 in SL; barbels 1.2–1.35 in HL; pelvic fins 1.35–1.5 in HL; lower-limb gill rakers 18–21; a striped pattern dorsally on body from a red spot on scales (Seychelles) ..... *seychellensis*

7b. Interorbital space medially flat; body depth 3.6–4.3 in SL; barbels 1.35–1.45 in HL; pelvic fins 1.5–1.65 in HL; lower-limb gill rakers 20–23; no striped pattern dorsally on body 8

8a. Posterior end of maxilla slightly wedge-shaped (Fig. 1 C); longest dorsal spine 1.55–1.75 in HL; lower-limb gill rakers 20 (Seychelles, 57 m) ..... *angulatus*, new species

8b. Posterior end of maxilla smoothly convex (Fig. 1 B); longest dorsal spine 1.8–2.0 in HL; lower-limb gill rakers 21–23 9

9a. Body depth 3.6–3.85 in SL; snout length 1.9–2.05 in HL; three red to deep pink spots in a triangular pattern on basal half of caudal in life (Mozambique, 25–51 m) ..... *nansen*, new species

9b. Body depth 3.95–4.3 in SL; snout length 2.05–2.3 in HL; caudal fin without three red to deep pink spots (Seychelles, Mozambique, and southwest India, 43–55 m) ..... *minys*, new species

10a. Body with a large elliptical yellow spot between lateral line and interdorsal space in life; a roundish black spot larger than eye on side of posterior half of caudal peduncle, more above than below lateral line; peritoneum of adults dark brown; lower-limb gill rakers 18–21 ..... *indicus*

10b. Colour of body not as in 10a (though a black or blackish spot may be present on caudal peduncle or caudal-fin base); peritoneum pale (except *barberinus*); gill rakers 21–27 11

11a. Scales of body below lateral line with a distinct white to light blue spot in life; mouth small, the upper-jaw length 3.0–3.55 in head length; a large elliptical white spot anteriorly on upper side of caudal peduncle (Persian Gulf to west coast of Pakistan) ..... *margaritatus*

11b. Scales of body below lateral line without a white to light blue spot; mouth not small, the upper-jaw length 2.3–3.0 in head length (except *forsskali*, its jaw length 2.75–3.15 in head length); a large white spot present or absent dorsally on caudal peduncle 12

12a. Basal one-third to one-half of second dorsal fin black, the dark pigment extending to distal end of last membrane. 13

12b. Basal one-third to one-half of second dorsal fin not black 14

13a. An oblique dark red to black band from upper end of gill opening to below rear base of second dorsal fin; no large black spot on side of caudal peduncle; barbels 1.35–1.55 in HL; penultimate dorsal ray 1.05--1.2 in length of last dorsal ray (Réunion and Mauritius, 5–100 m) ..... *diagonalis*

13b. A black stripe from upper end of gill opening following lateral line to caudal peduncle; a large black spot on upper half of caudal peduncle; barbels 1.1–1.25 in HL; penultimate dorsal ray 1.25–1.6 in length of last dorsal ray (Red Sea and east coast of Africa to East Indies, 3–40 m) ..... *macronemus*

14a. One or two dark brown to red stripes on head and body, the uppermost passing through eye.; barbels not long, 1.35–1.6 in HL 15

14b. No dark brown to red stripes on body; barbels long, from longer than head to 1.15 in HL 18

15a. A single dark brown or red stripe from front of snout through eye to below origin of second dorsal fin or beyond; a roundish black spot as large or larger than eye posteriorly on caudal peduncle 16

15b. Two red to brown stripes on head and body, the uppermost passing through eye and following anterior part of lateral line, bordered above and below by a whitish stripe; a saddle-like blackish spot on caudal peduncle preceded by a whitish spot 17

16a. Pectoral rays 16–18 (usually 17); peritoneum dark brown or black; caudal fin bluish in life; largest examined, 346 mm SL (Indo-Pacific, except Arabian seas and the Hawaiian Islands, 1--100 m) ..... *barberinus*

16b. Pectoral rays 14–17 (usually 16); peritoneum pale; caudal fin yellow in life; largest examined, 217 mm SL (Red Sea and Gulf of Aden, 1–30 m) ..... *forsskali*

17a. Pectoral rays 14–16 (usually 15); barbels short, 1.5–1.8 in HL; lower-limb gill rakers 21–25 (western Indian Ocean to Micronesia and French Polynesia, 2–90 m) ..... *ciliatus*

17b. Pectoral rays 15–17 (usually 16); barbels not short, 1.35–1.55 in HL; lower-limb gill rakers 19–22 (Red Sea and Gulf of Oman to South Africa, Seychelles, and Mascarene Islands, 2–200 m) ..... *rubescens*

18a. Grayish blue with a saddle-like yellow spot on caudal peduncle, or entirely yellow; lower-limb gill rakers 22–26; pectoral fins 1.5–1.7 in HL (Indo-Pacific, 5–125 m) ..... *cyclostomus*
18b. Red with a deeper red bar posteriorly on caudal peduncle; lower-limb gill rakers 27–29; pectoral fins 1.35–1.55 in HL (Réunion, 90–250 m). ..... *posteli*

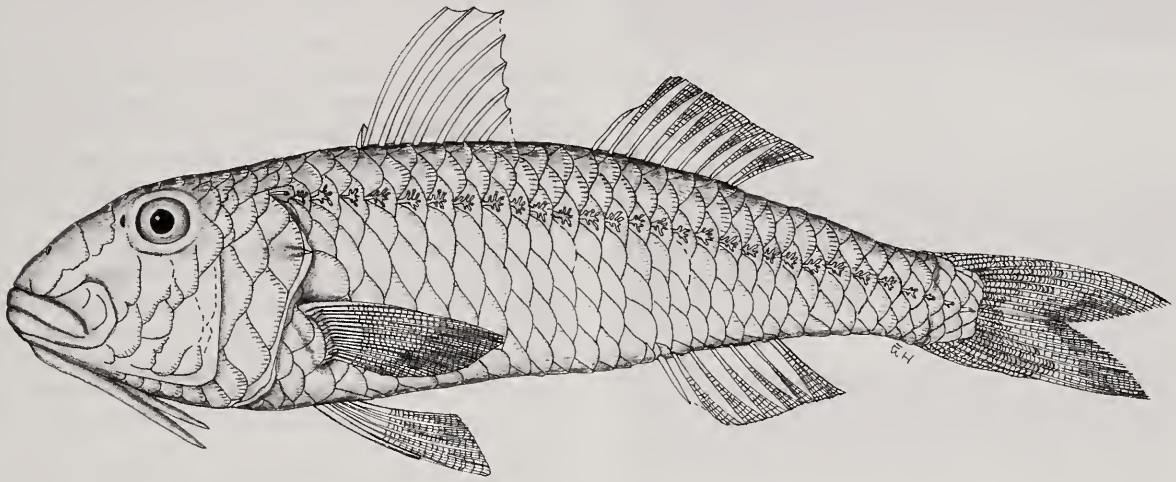

Fig. 4. Holotype of *Parupeneus angulatus*, SAIAB 82215, 141.5 mm SL, Mahé, Seychelles, 57 m (Drawn by E. Heemstra).

Parupeneus angulatus sp. nov.
Figs. 3 C, 4; Table 2

Parupeneus heptacanthus (non Lacepède) Randall 2004: 31 (Seychelles).

Holotype. SAIAB 82215, male, 141.5 mm, Seychelles Bank, southwest of Denis Island, 3°54'S, 55°49'E, ORSTOM-Seychelles Expedition, R/V *Coriolis*, station 49, bottom trawl, 57 m, detritic sand, 15 September 1980.

Paratype. BPBM 31309, male, 142.5 mm, same data as holotype.

Diagnosis. Pectoral-fin rays 15 or 16; gill rakers 6 + 20; body elongate, the depth 3.75–3.8 in SL; head length 3.0 in SL; interorbital space flat medially; snout length 2.0 in HL; posterior end of maxilla symmetrical, but angular, forming an angle of about 135°; depth of maxilla 4.6–4.8 in HL; barbel length 1.35–1.4 in HL; longest dorsal spine 1.55–1.75 in HL; pectoral fins 1.45–1.55 in HL; pelvic fins 1.6 in HL; colour in alcohol uniform light brown; caudal fin light brown, grading to pale yellowish distally; remaining fins pale yellowish; no information on colour in life.

Description. Dorsal-fin rays VIII + 9; anal-fin rays 7; second dorsal and anal-fin rays branched, except first; last dorsal and anal-fin rays branched to base; pectoral-fin rays 15 or 16 (15 on one side, 16 on other in both holotype and paratype); upper two pectoral-fin rays unbranched; pelvic-fin rays I,5; principal caudal-fin rays 15, the middle 13 branched; upper and lower procurrent caudal-fin rays 9, the posterior 2 segmented; lateral-line scales 27 (plus 3 pored scales on caudal-fin base); scales above lateral line to origin of first dorsal fin 2; scales below lateral line to origin of anal fin 5; circumpeduncular scales 14; median predorsal scales about 14 (anterior scales embedded); median prepelvic scales at least 7 (anterior scales missing); gill rakers 6 + 20; pseudobranchial filaments 26 (27); branchiostegal rays 3; vertebrae 10 + 14.

Body elongate, the depth 3.8 (3.75) in SL; body width 1.6 (1.55) in body depth; head length 3.0 in SL; snout length 2.0 in HL; orbit diameter 5.75 (5.8) in HL; interorbital space flat medially, rounded laterally, the bony width 3.65 (3.45) in HL; cheek depth 2.4 in HL; barbels just reaching or extending slightly beyond posterior margin of preopercle, their length 1.4 (1.35) in HL; caudal-peduncle depth 3.55 (3.6) in HL; caudal-peduncle length 1.5 (1.4) in HL.

Mouth ventral, and slightly oblique, the cleft forming an angle of about 15° to horizontal axis of head and body; mouth small, the maxilla nearly or just reaching a vertical at anterior edge of orbit; upper-jaw length 2.3 (2.2) in HL; depth of maxilla 4.8 (4.6) in head length; posterior edge of maxilla symmetrical but slightly

Table 2. Proportional measurements of type specimens of *Parupeneus angulatus* as percentages of SL.

	Holotype	Paratype
	SAIAB 82215	BPBM 31309
Standard length (mm)	141.5	142.5
Sex	male	male
Body depth	26.3	26.8
Body width	16.6	17.3
Head length	33.4	33.6
Snout length	16.9	17.0
Orbit diameter	5.8	5.8
Interorbital width	9.2	9.7
Cheek depth	13.8	14.0
Upper-jaw length	14.5	15.1
Depth of maxilla	7.3	7.3
Barbel length	23.9	25.1
Caudal-peduncle depth	9.4	9.4
Caudal-peduncle length	22.6	23.6
Pre-dorsal length	38.7	39.3
Pre-anal length	63.6	64.2
Pre-pelvic length	32.3	31.2
First dorsal-fin spine	2.8	2.9
Second dorsal-fin spine	17.5	19.3
Third dorsal-fin spine	aberrant	21.3
Fourth dorsal-fin spine	19.3	19.5
First dorsal-fin ray	7.8	6.4
Second dorsal-fin ray	10.3	11.7
Eighth dorsal-fin ray	7.6	7.4
Ninth dorsal-fin ray	9.2	8.4
Anal-fin spine	5.8	5.4
Seventh anal-fin ray	9.4	8.8
Caudal-fin length	23.7	22.4
Caudal concavity	14.0	12.7
Pectoral-fin length	22.4	21.8
Pelvic-fin spine length	12.8	12.5
Pelvic fin length	21.1	21.0

angular, forming an angle of about 135° (discounting rounded apex); many teeth missing on holotype; each side of upper jaw of paratype with a single row of 11 stout conical teeth, the first eight curving inwardly and posteriorly, the last three curving anteriorly; lower jaw with nine similar teeth, the first seven strongly curving posteriorly and inwardly, the last two nearly erect; largest tooth in jaws almost half pupil diameter in length; no teeth on vomer or palatines. Tongue fused to floor of mouth.

Posterior nostril a near-vertical slit at front of bony edge of orbit, in line with ventral half of pupil; anterior nostril a small, narrow, oblique aperture with a low rim, on a line two-thirds distance from dorsal edge of orbit to groove above front of upper lip. Longest gill raker about three-fourths length of longest gill filament on first gill arch.

Opercle with a single horizontal spine at level of ventral edge of orbit, its tip nearly or just reaching edge of opercular membrane; free edge of preopercle extending dorsally to level where covered by a large postorbital scale (beneath scale, free edge extends to level of lower edge of pupil); free ventral edge of preopercle extending forward to a vertical at posterior edge of maxilla.

Scales finely ctenoid; scales dorsally on head extending forward to an orbit diameter from groove at base of upper lip (anterior scales strongly embedded); six oblique rows of large scales on cheek to edge of preopercle; the first embedded, extending above anterior half of curved posterior part of maxilla, the last row of two scales at corner of preopercle; opercle largely covered by seven partially fused scales of variable size; subopercle and interopercle covered by a row of six scales, progressively smaller anteriorly; two embedded scales on expanded posterior side of maxilla, the anterior much smaller and overlapping base of posterior scale, both scales partly covered by upper lip; fins naked except for base of caudal fin with three near-vertical series of scales like those of body, followed by columns of small slender scales that extend more than half distance to posterior margin of fin (many scales missing); slender pelvic axillary scale nearly one-half length of pelvic spine; a midventral scaly process of two rounded scales at base of pelvic fins, the first slightly larger and broadly overlapping the second; sensory canals on lateral-line scales with three to nine branches.

Origin of dorsal fin over third lateral-line scale, the predorsal length 2.65 (2.6) in SL; first dorsal spine very short, 12.0 (11.5) in HL; third dorsal spine aberrantly fused to fourth spine in holotype (1.6 in HL in paratype); first ray of second dorsal fin 4.3 (5.25) in HL; second dorsal ray longest, 3.15 (2.9) in HL; eighth dorsal ray 1.2 (1.15) in length of ninth dorsal ray; ninth dorsal ray 3.65 (4.0) in HL; origin of anal fin below base of first ray of second dorsal fin, the preanal length 1.55 in SL; anal spine 5.75 (6.2) in HL; seventh anal soft ray longest, 3.55 (3.8) in HL; caudal-fin length 1.35 (1.5) in HL; caudal fin

strongly forked, the caudal concavity 2.25 (2.65) in HL; fourth and fifth pectoral rays longest, 1.45 (1.55) in HL; pelvic spine 2.6 (2.7) in HL; pelvic fins short, 1.6 in HL.

Colour of holotype in alcohol uniform light brown; caudal fin light brown, grading to pale yellowish distally; remaining fins pale yellowish.

Etymology. This species is named *Parupeneus angulatus* from the Latin *angulus*, in reference to the obtusely angular posterior edge of the maxilla.

Remarks. The two type specimens of *Parupeneus angulatus*, both mature males, were collected by trawl in 57 m on the Seychelles Bank from the French research vessel *Coriolis* in September 1980. They were sent as a gift from the Muséum National d'Histoire Naturelle in Paris to the Bishop Museum in 1984, and were initially misidentified as *P. heptacanthus*. They should have been recognised as different from *P. heptacanthus* by the more slender body, the flat median interorbital, and the lack of any trace of the dark spot on the side of the body that is characteristic of the latter species (Figs. 1 and 2). More definitive differences are the slightly angular posterior shape of the maxilla and the low count of 6 + 20 gill rakers, compared to 6–7 + 21–23 for *P. heptacanthus* (Table 1). No additional specimens of this species are present in the Muséum National d'Histoire Naturelle, and no information is available on the fresh colouration of the two type specimens.

The new species *Parupeneus minys*, described below, has the same general head and body shape and might have been considered as the young of *P. angulatus*, were it not for their being fully mature. Although there is complete separation of the two on gill-raker counts, the sample size is too small to be definitive. If a comparison is made of the morphometrics (Tables 1 and 2), some obvious differences will be noted, such as the more slender body, larger eye, and shorter first dorsal fin of *P. minys*. However, these three differences are to be expected with growth. Other differences, such as the depth of the maxilla and pectoral-fin length, are more constant with increasing size. The maxillary depth measurements of *P. minys* of Table 3 do not show a trend with specimen length. The 19 specimens of *P. seychellensis* (ANSP 108697, 114–231 mm SL) have a maxillary depth that varies from only 5.2–5.5 in the head length, with no correlation with size. Therefore, a maxillary depth of 4.6–4.8 in the head length for *P. angulatus* is clearly different from the range of 5.45–5.8 for *P. minys*. A comparison of Tables 2 and 3 also shows the significant difference in pectoral-fin length of the two species.

Parupeneus minys sp. nov.
Figs. 5, 6; Table 3

Parupeneus jansenii (non Bleeker) Randall & van Egmond 1994: 54, fig. 28 (Vizhinjam, Kerala, India).

Parupeneus heptacanthus (non Lacepède) Randall 2004: 31, pl. IV D (Poivre Atoll, Amirantes, Seychelles, and Vizhinjam, Kerala, India).

Fig. 5. Holotype of *Parupeneus minys*, BPBM 35553, 70 mm SL, Poivre Atoll, Amirantes, Seychelles, 43-48 m (Photo by J. E. Randall).

Fig. 6. Paratype of *Parupeneus minys*, BPBM 27693, 83.5 mm SL, Kerala, India (Photo by J. E. Randall).

Holotype. BPBM 35553, male, 70 mm, Seychelles, Amirantes, Poivre Atoll, 5°44'S, 53°20'E, coarse calcareous sand bottom with rhodolites, 43–48 m, rectangular dredge, R/V *Tyro*, Station 766, J. van der Land et al., 29 December 1992.

Paratypes. BPBM 40948, female, 83.5 mm, USNM 395007, female 79.5 mm, both with same data as holotype; BPBM 27693, female, 83 mm, India, Kerala, Vizhinjam fishing harbour (south of Trivandrum), purchased from fisherman, J. E. Randall, 13 February 1980; MNHN 2008-2473, male, 106 mm, same data as preceding; SAIAB 81381, male, 106.5 mm, Mozambique, 20°14.8'S, 35°48.4'E - 20°16.3'S, 35°48.4'E, R/V *Dr. Fridtjof Nansen* Station 76, trawl, 54–55 m, P.C. & E Heemstra, 12 October 2007.

Diagnosis. Pectoral-fin rays 15 or 16; gill rakers 6 + 21–22; body elongate, the depth 3.95–4.3 in SL; head length 2.9–3.05 in SL; interorbital space flat medially; snout length 2.05–2.3 in HL; posterior edge of maxilla symmetrically convex; maximum depth of maxilla 5.45–5.8 in HL; barbel length 1.35–1.45 in HL; longest dorsal spine 1.8–1.95 in HL; pectoral fins 1.3–1.4 in HL; pelvic fins 1.5–1.65 in HL; colour in alcohol uniform tan except for specimens from the Seychelles with areas of white ventrally on head below eye and on lower two-fifths of body; no dark markings; fins translucent pale

Table 3. Proportional measurements of type specimens of *Parupeneus minys* as percentages of SL.

	Holotype	Paratypes				
	BPBM 35553	USNM 395007	BPBM 40948	BPBM 27693	MNHN 08-2473	SAIAB 81381
Standard length (mm)	70	79	83.5	84	106	106.5
Sex	male	female	female	female	male	male
Body depth	23.3	25.0	25.4	25.2	24.3	23.8
Body width	15.5	15.0	15.8	15.3	15.3	15.5
Head length	33.2	33.8	32.9	33.2	34.2	34.1
Snout length	14.4	14.5	15.8	15.2	16.5	16.5
Orbit diameter	8.6	8.7	8.3	8.2	7.0	7.5
Interorbital width	7.9	7.8	7.6	7.3	7.8	7.9
Cheek depth	10.3	10.8	11.7	11.2	12.1	11.5
Upper-jaw length	11.6	12.0	12.2	11.6	12.9	12.6
Depth of maxilla	5.7	6.2	6.0	5.9	6.1	6.0
Barbel length	24.3	25.2	24.6	25.0	24.0	23.6
Caudal-peduncle depth	8.8	9.0	9.4	9.1	9.2	9.2
Caudal-peduncle length	23.9	22.6	22.5	23.3	23.2	24.0
Pre-dorsal length	39.3	39.6	40.6	40.4	39.5	39.5
Pre-anal length	64.5	64.7	65.7	65.9	64.0	63.9
Pre-pelvic length	32.3	32.0	32.2	32.5	32.3	32.0
First dorsal-fin spine	1.8	2.1	2.3	2.0	2.6	2.1
Second dorsal-fin spine	16.4	15.3	15.5	14.5	15.3	15.4
Third dorsal-fin spine	18.5	broken	18.2	17.7	17.6	17.3
Fourth dorsal-fin spine	17.0	16.4	17.3	16.5	16.3	16.2
First dorsal-fin ray	8.2	8.5	7.3	7.4	6.8	5.8
Second dorsal-fin ray	12.9	12.6	12.7	11.9	11.8	10.9
Eighth dorsal-fin ray	7.1	7.5	7.8	7.4	7.6	7.5
Ninth dorsal-fin ray	8.3	8.8	8.6	8.5	8.4	7.8
Anal-fin spine	7.2	7.6	7.3	7.2	6.8	6.8
Seventh anal-fin ray	8.3	8.7	8.6	8.4	8.0	8.6
Caudal-fin length	27.2	28.7	28.2	27.3	broken	27.0
Caudal concavity	16.0	16.6	15.7	16.3	–	15.8
Pectoral-fin length	24.8	25.4	24.8	24.5	24.1	24.8
Pelvic-fin spine length	14.7	14.5	13.4	14.2	13.2	12.4
Pelvic fin length	21.7	22.8	22.2	22.0	20.7	23.2

yellowish; colour when fresh, pink dorsally, pale pink to white ventrally, with an indistinct pale yellow stripe along lateral line; some lateral-line scales with a bluish white dash; a bluish white line encircling ventral part of eye and continuing obliquely to upper lip; three small bluish white blotches dorsally on head, one directly above eye; barbels white; median and pelvic fins translucent blotchy yellow with small pale blue to whitish spots along rays that outline faint transverse yellowish bands. Largest specimen, 106.2 mm SL.

Description. Dorsal-fin rays VIII + 9; anal-fin rays 7; second dorsal- and anal-fin rays branched, except first, the last branched to base; pectoral-fin rays 15, 16 (15 or 16, mostly 16), the upper 2 unbranched; pelvic rays I, 5; principal caudal-fin rays 15, the middle 13 branched; upper procurrent caudal-fin rays 8 (8 or 9, usually 8); lower procurrent caudal-fin rays 9 (8 or 9, usually 9); the posterior 2 segmented; lateral-line scales 27 (plus 3 on caudal-fin base); scales above lateral line to origin of first dorsal fin 2; scales below lateral line to origin of anal fin 5; circumpeduncular scales 14; median predorsal scales 14; median prepelvic scales 9, increasingly smaller anteriorly; gill rakers 6 + 22 (6 + 21–22); pseudobranchial filaments 19 (22–24); branchiostegal rays 3; vertebrae 10 + 14.

Body elongate, the depth 4.3 (3.95–4.0) in SL; body width 1.5 (1.55–1.65) in body depth; head length 3.0 (2.9–3.05) in SL; snout length 2.3 (2.05–2.3) in HL; orbit diameter 3.85 (3.9–4.9) in HL; interorbital space flat medially, rounded laterally, the bony width 4.5 (4.25–4.4) in HL; cheek depth 3.2 (2.8–3.5) in HL; barbels reaching slightly beyond posterior edge of preopercle, their length 1.35 (1.35–1.45) in HL; caudal-peduncle depth 3.8 (3.5–3.75) in HL; caudal-peduncle length 1.4 (1.4–1.5) in HL.

Mouth ventral, and slightly oblique, the gape forming an angle of about 20° to horizontal axis of head and body; mouth small, the upper jaw not reaching a vertical at anterior edge of orbit; upper-jaw length 2.85 (2.65–2.85) in HL; posterior edge of maxilla symmetrically rounded; maximum depth of maxilla 5.8 (5.45–5.65) in HL; upper jaw of holotype with a single row of 15 unevenly spaced, incurving conical teeth, and lower jaw with 13; longest teeth in jaws the fifth or sixth; no teeth on vomer or palatines. Tongue fused to floor of mouth.

Posterior nostril a vertical slit at front edge of orbit slightly below centre of eye, its length about one-fourth pupil diameter; anterior nostril a small aperture with a low rim at level of ventral edge of orbit one-half distance from posterior nostril to front of upper lip. Longest gill raker as long as longest gill filament on first gill arch.

Opercle with a single horizontal spine at level of centre of orbit, its tip nearly reaching edge of opercular membrane; free edge of preopercle extending dorsally to level where covered by a large postorbital scale (on specimens with this scale missing, free edge extends to level of lower edge of pupil); free ventral edge of preopercle extending forward to a vertical at anterior edge of orbit.

Scales finely ctenoid; scales dorsally on head extending forward two-thirds orbit diameter from front of upper lip (anterior scales embedded); six oblique rows of large scales on cheek to edge of preopercle; the first embedded, extending above anterior half of curved posterior part of maxilla, the last row of two scales at corner of preopercle; opercle largely covered by seven partially fused scales of variable size; subopercle and interopercle covered by a row of six scales, progressively shorter anteriorly; two scales on expanded posterior side of maxilla, the anterior about one-half size of posterior and overlapping base of posterior scale; fins naked except for base of caudal fin with three rows of scales like those of body, followed by columns of small, slender scales extending about halfway along fin (many scales missing); slender pelvic axillary scale more than one-half length of pelvic spine; a midventral scaly process of two rounded scales at base of pelvic fins, the first broadly overlapping second scale and slightly larger than second scale; sensory canals on lateral-line scales with three to five branches, very short posteriorly (three to seven branches on largest paratype).

Origin of dorsal fin over third lateral-line scale, the predorsal length 2.6 (2.55–2.6) in SL; first dorsal spine very short, 18.4 (13.3–16.5) in HL; third dorsal spine longest, 1.8 (1.9–2.1) in HL; first ray of second dorsal fin 4.05 (4.0–5.9) in HL; second dorsal ray longest, 2.6 (2.5–3.1) in HL; eighth dorsal ray 1.25 (1.15) in length of ninth dorsal ray; ninth dorsal ray 3.8 (3.9–4.0) in HL; origin of anal fin below base of first ray of second dorsal fin, the preanal length 1.55 (1.5–1.55) in SL; anal spine 4.6 (4.45-5.05) in HL; seventh anal soft ray longest, 4.0 (3.8–4.25) in HL; caudal-fin length 1.2 (1.15-1.4) in HL; caudal fin strongly forked, the caudal concavity 2.05 (2.0–2.1)) in HL; fourth and fifth pectoral rays longest, 1.35 (1.35–1.4) in HL; pelvic spine 2.25 (2.3–2.75) in HL; pelvic fins short, 1.55 (1.45–1.65) in HL.

Colour of holotype in alcohol uniform tan except for a series of vertically elongate whitish patches ventrally on body posterior to pectoral fins; scaled portion of cheek and operculum white; no dark markings; fins translucent pale yellowish. Colour of holotype when fresh shown in Fig. 5, and colour of 84.2-mm paratype from Kerala, India in Fig. 6.

Etymology. We name this species *Parupeneus minys* from the Greek word meaning small, in reference to its very small adult size for a species of the genus.

Remarks. The first author was one of the scientific party of the Dutch expedition to the Seychelles on the R/V *Tyro* in 1992 (van der Land 1994). Three small specimens of a pink goatfish with a yellow stripe were collected in a dredge haul from 43–48 m. A photograph was taken of the smallest, which was the least damaged by the dredge. It was identified as *Parupeneus jansenii* (Bleeker) by Randall & van Egmond (1994: 54, fig. 28),

and reidentified by Randall (2004: 31, pl. IV D) as *P. heptacanthus* (Lacepède). The specimen was presumed to be a juvenile of the species, in view of its small size. The abdomen was slit during the present study to see if the sex could be determined. It is a ripe female. *Parupeneus heptacanthus* attains a standard length of at least 290 mm, so the small mature Seychelles fish are not apt to be *P. heptacanthus*.. Counts of pectoral rays and gill rakers are the same, but the barbels are shorter, 1.35–1.45 in HL, compared to 1.1–1.35 for *P. heptacanthus*, and the snout is longer, 2.05–2.3 in HL, compared to 1.75–2.1 for *P. heptacanthus*. Comparison was made with two lots of juveniles of *P. heptacanthus* collected by the first author at Flores, Indonesia, BPBM 32216, 3: 60–72 mm, and BPBM 34097, 84 mm, and there was no overlap in these two measurements. All four specimens from Flores show the typical dark spot on and below the eighth lateral-line scale, which is not present in *P. minys*.

Parupeneus nansen sp. nov.
Figs. 7, 8; Table 4

Holotype. SAIAB 81380, male, 125 mm, Mozambique, 24°33.7'S, 35°15.6'E – 24°32.3'S, 35°15.6'E, R/V *Dr. Fridtjof Nansen*, station 46, trawl, 50–51 m, E. & P.C. Heemstra, 12 October 2007.

Paratypes. USNM 395047, male, 139 mm, Mozambique, 26°9.4'S, 32°58.6'E – 26°10.4'S, 32°58.3'E, R/V *Dr. Fridtjof Nansen*, station 6, trawl, 43–45 m, E. & P.C. Heemstra, 30 September 2007; BPBM 40949, female, 114 mm, same data as holotype; SAIAB 81683, male, 133 mm, Mozambique, 18°39.6'S, 37°3.3'E – 18°41.9'S, 37°3.6'E, R/V *Dr. Fridtjof Nansen*, station 95, trawl, 36–37 m, E. & P.C. Heemstra, 29 October 2007.

Nontype specimens. BPBM 31276, 7: 125–160 mm, Indian Ocean, off coast of Somalia, 11°18'N, 51°8'E, 25–29 m, R/V *Anton Bruun*, cruise 9, station 459, trawl, A. Fehlmann, 17 December 1964.

DIAGNOSIS. Pectoral-fin rays 15 or 16; gill rakers 6 or 7 + 21–23; body moderately elongate, the depth 3.6–3.85 in SL; head length 2.85–2.95 in SL; interorbital space flat medially; snout length 1.9–2.05 in HL; interorbital space flat medially; maxilla symmetrically rounded posteriorly; depth of maxilla 5.05–5.3 in HL; barbel length 1.35–1.45 in HL; longest dorsal spine 1.85–2.0 in HL; pectoral fins 1.35–1.4 in HL; pelvic fins 1.5–1.6 in HL; colour in alcohol pale tan, the edges of the scales a little darker; a faint orangish brown stripe following lateral line; no dark spot on eighth lateral-line scale; fins translucent pale yellowish; colour when fresh light yellowish grey dorsally, the scale edges narrowly red, grading to silvery grey below, the red edges of scales progressively fainter ventrally; head broadly red dorsally, grading to silvery white on cheek and operculum; barbels white; caudal fin with three large deep pink to red spots, one in each lobe and one at midbase of fin.

Fig. 7. Holotype of *Parupeneus nansen*, SAIAB 81380, 125 mm SL, Mozambique, 24°33'S, 35°15'E, 50–51 m (Photo by P.C. Heemstra).

Fig. 8. Paratype of *Parupeneus nansen*, USNM 395047, male, 139 mm SL, Mozambique, 26°9.5'S, 32°58.5'E, 43–45 m (Photo by P.C. Heemstra).

DESCRIPTION. Dorsal-fin rays VIII + 9; anal-fin rays 7; second dorsal- and anal-fin rays branched, except first, the last branched to base; pectoral-fin rays 16 (16, one with 15 on one side), the upper 2 unbranched; pelvic-fin rays I, 5; principal caudal-fin rays 15, the middle 13 branched; upper and lower procurrent caudal-fin rays 9, the posterior 2 segmented; lateral-line scales 27 (plus 3 on caudal-fin base); scales above lateral line to origin of first dorsal fin 2; scales below lateral line to origin of anal fin 5; circumpeduncular scales 14; median predorsal scales 15; median prepelvic scales 9, increasingly smaller anteriorly; gill rakers 6 + 22 (6 or 7 + 21–23); branchiostegal rays 3; vertebrae 10 + 14.

Body depth 3.7 (3.6–3.85) in SL; body width 1.55 (1.45–1.6) in body depth; head length 2.95 (2.8–2.95) in SL; snout length 1.95 (1.9–2.05) in HL; orbit diameter 5.05 (4.95–5.4) in HL; interorbital space flat medially, rounded laterally, the bony width 4.25 (4.0–4.2) in HL; cheek depth 2.65 (2.2–2.5) in HL; barbels reaching slightly beyond posterior margin of preopercle, their length 1.35 (1.3–1.4) in HL; caudal-peduncle depth 3.7 (3.4–3.95) in HL; caudal-peduncle length 1.5 (1.5–1.65) in HL.

Mouth ventral, and slightly oblique, the gape forming an angle of about 20° to horizontal axis of head and body; mouth small, the upper-jaw length 2.55 (2.45–

Table 4. Proportional measurements of type specimens of *Parupeneus nansen* as percentages of SL.

	Holotype	Paratypes		
	SAIAB 81380	BPBM 40949	SAIAB 81683	USNM 395047
Standard length (mm)	125	114	133	139
Sex	male	female	male	male
Body depth	27.0	33.8	26.0	27.8
Body width	17.3	16.5	16.4	18.8
Head length	33.8	33.8	34.7	35.2
Snout length	17.3	16.5	17.7	18.5
Orbit diameter	6.7	7.0	6.6	6.5
Interorbital width	8.0	8.1	8.3	8.8
Cheek depth	12.7	12.4	13.7	14.0
Upper-jaw length	13.2	13.2	14.1	14.4
Depth of maxilla	6.7	6.4	6.5	6.8
Barbel length	24.8	24.5	26.5	25.1
Caudal-peduncle depth	9.1	10.0	8.8	9.0
Caudal-peduncle length	22.8	21.1	21.2	23.1
Pre-dorsal length	39.3	39.4	40.1	39.8
Pre-anal length	64.6	66.4	66.5	65.1
Pre-pelvic length	31.9	32.2	33.5	35.6
First dorsal-fin spine	2.1	1.9	1.9	1.7
Second dorsal-fin spine	17.2	17.6	17.6	16.5
Third dorsal-fin spine	18.4	broken	18.3	17.8
Fourth dorsal-fin spine	17.4	13.9	broken	15.5
First dorsal-fin ray	8.4	broken	8.5	8.2
Second dorsal-fin ray	11.4	11.6	11.8	10.1
Eighth dorsal-fin ray	7.6	7.7	7.6	7.5
Ninth dorsal-fin ray	8.8	8.8	8.6	8.8
Anal-fin spine	7.2	7.4	7.5	7.2
Seventh anal-fin ray	9.6	9.2	9.0	9.5
Caudal-fin length	24.8	24.3	25.0	24.1
Caudal concavity	13.8	13.0	13.8	12.8
Pectoral-fin length	24.0	25.1	24.8	25.0
Pelvic-fin spine length	13.2	14.2	14.0	13.9
Pelvic fin length	21.6	22.6	21.6	21.6

2.55) in HL; posterior edge of maxilla symmetrically convex; maximum depth of maxilla 5.1 (5.25–5.55) in HL; jaws with a single row of well-spaced, bluntly conical teeth, 10–12 on each side of upper jaw, and 8 or 9 in lower jaw (counting gaps for missing teeth), the anterior teeth very short; teeth curving inwardly and posteriorly, except last which curves anteriorly; no teeth on vomer or palatines. Tongue fused to floor of mouth.

Posterior nostril a short vertical slit at front edge of orbit slightly below centre of eye; anterior nostril a small aperture with a low rim at level of ventral edge of orbit half way to front of upper lip. Longest gill raker nearly one-half length of longest gill filament.

Opercle with a single horizontal spine at level of centre of orbit, its tip nearly reaching edge of opercular membrane; free edge of preopercle extending dorsally to level of lower edge of orbit where covered by a large postorbital scale; free ventral edge of preopercle ending a pupil diameter anterior to a vertical at front edge of orbit.

Scales finely ctenoid; scales dorsally on head extending forward to an orbit diameter from front of upper lip; six oblique rows of large scales on cheek to edge of preopercle; the first two rows embedded, extending above curved posterior part of maxilla, the last row of two scales at corner of preopercle; opercle largely covered by seven partially fused scales of variable size; subopercle and interopercle covered by a row of six scales, progressively shorter anteriorly; two scales on expanded posterior side of maxilla, the anterior about one-third size of posterior and overlapping base of posterior scale; fins naked except for base of caudal fin with three rows of scales like those of body, followed by columns of small slender scales extending about half way out in fin; slender pelvic axillary scale nearly one-half length of pelvic spine; a midventral scaly process of two rounded scales at base of pelvic fins, the anterior broadly overlapping the posterior; sensory canals on lateral-line scales with four to ten branches.

Origin of dorsal fin above third lateral-line scale, the predorsal length 2.25 (2.5–2.55) in SL; first dorsal spine very short, 16.1 (17.8–20.7) in HL; third dorsal spine longest, 1.85 (1.9–2.0) in HL; first ray of second dorsal fin 2.9 (3.0–4.1) in HL; second dorsal ray longest, 3.25 (2.9–3.5) in HL; eighth dorsal ray 1.25 (1.15–1.55) in length of ninth dorsal ray; ninth dorsal ray 3.8 (3.9–4.05) in HL; origin of anal fin below base of first ray of second dorsal fin, the preanal length 1.55 (1.5) in SL; first anal ray 4.7 (4.55–4.8) in HL; seventh anal soft ray longest, 3.5 (3.7–4.25) in HL; caudal-fin length 1.35 (1.4–1.45) in HL; caudal fin strongly forked, the caudal concavity 2.45 (2.5–2.75)) in HL; fourth and fifth pectoral rays longest, 1.4 (1.35–1.4) in HL; pelvic spine 2.55 (2.4–2.5) in HL; pelvic fins short, 1.55 (1.5–1.6) in HL.

Colour of holotype in alcohol pale tan, the edges of scales a little darker; a faint midlateral orangish brown stripe on body, beginning above pectoral-fin base, where about an eye diameter in width, narrowing posteriorly, ending in a faint spot of the same colour about two-thirds size of eye; no dark spot on eighth lateral-line scale; fins translucent pale yellowish.

Colour of holotype when fresh shown in Figure 7.

ETYMOLOGY. We name this species *Parupeneus nansen*, treating it as a noun in apposition, for the research vessel *Dr. Fridtjof Nansen*, from which the type specimens were collected, and to honour the famous Norwegian explorer and scientist for whom the vessel was named. During the cruise, the scientific staff referred to the specimens of this fish as the "Nansen Goatfish."

REMARKS. On 30 September 2007, when the catch of a trawl haul off the coast of southern Mozambique in 43–45 m from the *Dr. Fridtjof Nansen* was being sorted, the second author noticed that one specimen of a goatfish was unusual in having three red spots on the caudal fin. She set it aside to be photographed. Three more specimens with the same caudal colouration were collected by trawling nearby at a depth of 50–51 m in October. These four fish are the type specimens of *Parupeneus nansen*.

Seven additional specimens of this species (BPBM 31276, 7: 125–160 mm) were found in the Bishop Museum fish collection that had been misidentified as *P. heptacanthus*. They were taken by trawling in 25–29 m off the northeastern coast of Somalia at 11°18'N during the International Indian Ocean Expedition in 1964. No information is available on the colouration in life. These specimens are not designated as paratypes.

The pectoral-ray counts of 15 or 16 (mainly 16) and the gill-raker counts of 6 or 7 + 21–23 of *Parupeneus nansen* are the same as those of *P. heptacanthus*. The two species are readily distinguished in life colouration (compare Figs. 2 and 3 of *P. heptacanthus* with Figs. 7 and 8 of *P. nansen*). The most important morphometric differences are the longer barbels of *P. heptacanthus*, 1.0–1.3 in HL in 15 Bishop Museum specimens, 60–257 mm SL, compared to 1.3–1.45 in HL of *P. nansen*, and the pelvic fins are longer in *P. heptacanthus*, 1.3–1.5 in HL, compared to 1.5–1.65 in *P. nansen*.

Parupeneus seychellensis (Smith & Smith)
Fig. 9

Pseudupeneus seychellensis Smith & Smith, 1963: 22, pl. 88, fig. B (Seychelles).

Material Examined. Holotype of *Pseudupeneus seychellensis*, SAIAB 32, 200 mm, Seychelles, Mahé market, J.L.B. Smith and M.M. Smith, 19 October 1954; ANSP 108689, 19: 115–231 mm, Mahé, Beau Vallon Bay, NNW of Hotel des Seychelles; 4°37'S, 55°26'E, 12–15 m, isolated patch of rock and coral, with sponges and much sand, rotenone, J. E. Böhlke, D. Dockins, R. Rosenblatt, W. Starck II and J. Tyler, 19 March 1964; SAIAB 77868, 170 mm, Mahé,

Fig. 9. *Parupeneus seychellensis*, SAIAB 77868, 170 mm SL, Mahé, Seychelles, 17 m (Photo by P. C. Heemstra).

Baie aux Chagrins, 4.6290998°S, 55.3767014°E, rotenone, 17 m, P.C. Heemstra, E. Heemstra, M. Smale, K. Moots, and M. Mwale, 7 May 2005.

DIAGNOSIS. Pectoral-fin rays 16; gill rakers 6 + 18–21; body depth 3.1–3.5 in SL; head length 3.0–3.15 in SL; snout length 1.8–1.95 in HL; interorbital space convex; length of barbels 1.2–1.35 in HL; depth of maxilla 5.2–5.5 in HL; longest dorsal spine 1.6–1.75 in HL; pectoral-fin length 1.25–1.35 in HL; pelvic-fin length 1.35–1.5 in HL; colour in alcohol tan, with an indistinct midlateral yellowish brown stripe on body, beginning as broad as eye above pectoral-fin base, narrowing posteriorly, then broadening on caudal peduncle (stripe not present in life); colour when fresh as in Fig. 9. Noteworthy is the striped pattern dorsally on the body from a red spot on each scale of the first three longitudinal scale rows.

REMARKS. *Parupeneus seychellensis* (Smith & Smith) was described principally from a colour painting by Margaret M. Smith. The only diagnostic character given in the one-line description was the gill-raker count of 6 + 18 (corrected from examination of the holotype to 6 + 19). As mentioned, this species was considered a synonym of *P. cinnabarinus* by Ben-Tuvia in Smith & Heemstra (1986) and *P. heptacanthus* by Randall (2004). We have determined that it is a valid species, distinct from *P. heptacanthus* by having 18–21 lower-limb gill rakers, compared to 21–23 for *P. heptacanthus* (Table 1), shorter pelvic fins, 1.55–1.6 in HL, vs. 1.3–1.5 for *P. heptacanthus*, and in colour, mainly in lacking the dark reddish spot on and below the eighth lateral-line scale, and in having a striped pattern dorsally on the body from a red spot on each scale of the upper three longitudinal scale rows (compare Figs. 1 and 2 of *P. heptacanthus* with Fig. 9 of *P. seychellensis*).

The specimens of *Parupeneus heptacanthus* were examined from 31 different institutions for the revision of the genus. Because *P. seychellensis* was not distinguished from *P. heptacanthus* in the revision, and undescribed species were misidentified as *P. heptacanthus*, the comparative material of the latter for this study was restricted to the specimens listed below.

MATERIAL OF *PARUPENEUS HEPTACANTHUS* EXAMINED. Marshall Islands, Enewetak Atoll: BPBM 18393, 223 mm; BPBM 19950, 175 mm. New Caledonia: BPBM 27097, 163 mm. Lord Howe Island: BPBM 14894, 221 mm. Indonesia, Ambon: BPBM 19210, 2: 165-176 mm; Flores, BPBM 32216, 3: 60-70 mm; BPBM 34097, 84.5 mm; Lombok, BPBM 29732, 3: 119–130 mm. Andaman Sea, off southwestern Thailand: BPBM 31261, 137 mm. Seychelles: MNHN 1982-31, 185 mm; MNHN 1982-36, 4: 178–209 mm. Persian Gulf, Bahrain: BPBM 29415, 257 mm. Red Sea, Gulf of Aqaba: HUJ 8330, 225 mm. Tanzania, Pemba Channel: BPBM 33438, 123 mm.

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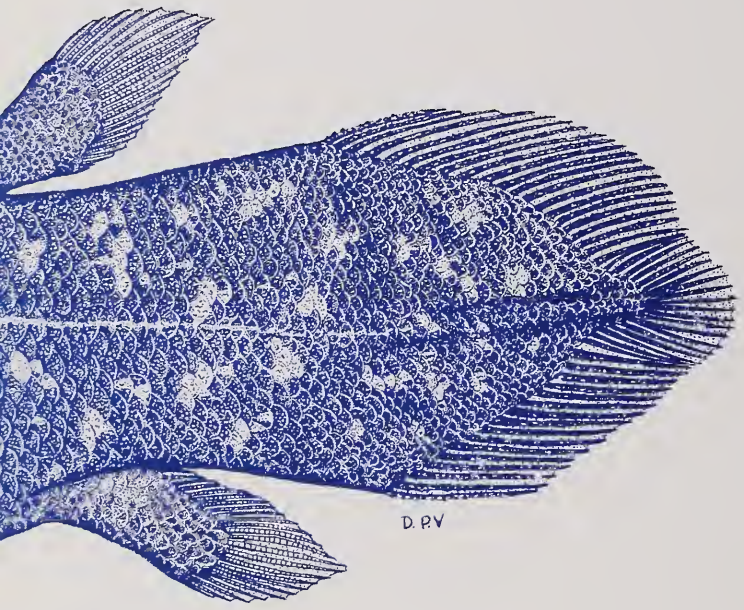

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